ON THE VALUE OF

PHOSPHORUS,

AS A REMEDY FOR

LOSS OF NERVE POWER

AND

FUNCTIONAL DISORDERS OF THE NERVOUS SYSTEM,

INDUCED BY

OVER-WORK

AND THE EXIGENCIES OF

MODERN LIFE.

With Formulæ and Directions for Treatment.

BY

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FIFTH EDITION.

LONDON:
H. K. LEWIS, 136, GOWER STREET.
1881.

Butler & Tanner,
The Selwood Printing Works,
Frome, and London.

PREFACE TO FIRST EDITION.

IT is almost needless to remark that this pamphlet is written for professional eyes only. Lay readers cannot be too often reminded that medicines powerful for good are also powerful for evil if misapplied. It is an indubitable fact that the most intelligent efforts of the inexperienced and uninitiated in the mysteries of medical science are, compared with those of persons whose whole lives have been devoted to the study of the subject, feeble, and often injurious. A variety of circumstances govern the selection of remedies, which can only be duly appreciated by a qualified practitioner; and it is by a careful discrimination alone of the many peculiarities of a case, and a judicious combination of remedial measures, that a successful issue can be attained. To the non-professional reader, therefore, expediency as well as prudence suggests the propriety of obtaining medical sanction and direction before using so important an agent as Phosphorus.

E. A. K.

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INTRODUCTION.

Long neglect of Phosphorus in medicine explained.—Its toxic properties developed only when improperly administered.—Its chemical characters, and the difficulties besetting its pharmacy.

PHOSPHORUS has long been known to the physician and therapeutist as a powerful remedial agent. It has been largely employed as a nervine tonic and renovator of nerve tissue both in America and on the Continent. Its employment in this country was, however, wholly neglected till 1871.

At that time my attention was directed to the subject, and I published in the first edition of this work some remarks on its value in medicine, and explained the means by which it could be safely administered. Up to that time the pharmacy of Phosphorus and its administration was very imperfectly understood; its value consequently had not been practically tested, even in those diseases in which theoretically it was indicated, and commonly reputed to possess remarkable remedial power. It was some years before English practitioners could be induced to regard it as other than a dangerous medicine, and they employed it only as a *dernier ressort* in exceptionally desperate, or in almost hopeless cases, that had resisted every other remedy. The results obtained in these cases were, notwithstanding its administration was often defective, very far from discouraging. It would indeed appear that the neglect of this remarkable agent was attributable to the absence of official or reliable formulæ, and the means of administering it safely and effectively,

rather than to the want of belief in its value. The chemical properties of Phosphorus, its liability to oxidation, inflammability on exposure, insolubility in fluids less volatile than ether and absolute alcohol, as well as a liability to decompose when dissolved in oil, surrounded its pharmacy with almost insurmountable difficulties. Its administration was therefore attended with great uncertainty and danger; and for many years these difficulties proved fatal to its general use. The profession very properly abstained from prescribing an agent for the administration of which no official directions existed, and the only known preparations of which, when employed, were tolerably certain to be followed by toxic symptoms, —that is, by severe nausea, vomiting, and general gastro intestinal irritation. It may be fairly said that until I published my Formula for its preparation, no method was known by which Phosphorus in its elemental state could be either safely or efficiently administered. Since 1871 Phosphorus has, year by year, been increasingly prescribed; and as its value has become known, its employment has extended to many forms of diseases over which until lately it was not known to possess any special remedial power. Phosphorus is as harmless as Iron, Quinine, or Cod Liver Oil; while as a nutritive tonic it is far more efficient. Many of my patients have taken it for six and eight months consecutively without exhibiting any of the toxic symptoms which have been attributed to it in books on Materia Medica. In therapeutic doses, prepared and administered in the manner about to be described, its complete assimilation is secured, and it exhibits no poisonous properties. For many years I have prescribed it daily, and according to my experience it is a safe remedy. It causes no irritation of the stomach or intestines, nor does it disturb digestion or impair the appetite, but on the contrary promotes both; in short,

I have never seen a case in which it has given rise to any serious inconvenience. Phosphorus, in common with all other medicines, may be and no doubt is sometimes used improperly in unsuitable cases, or even when distinctly contra-indicated. It is now very extensively prescribed, and is frequently taken without advice, as commonly as Quinine or any other popular medicine, and it is scarcely to be expected that in all cases it is taken judgmatically and with discrimination.

If it has failed in some instances—and no doubt it has—to produce all that was expected of it, it is satisfactory to be able to say that, so far as I know, no injurious effects have followed its employment when it has been administered in the manner recommended by me, and it is fair to infer that the high repute which Phosphorus has acquired in this country, is due to the facility and safety with which it is administered in the various formulæ which I have published. In 1874 it very properly found a place in the British Pharmacopœia, and although the officinal preparations then introduced failed to remove the difficulties which beset its pharmacy, their presence affords evidence of the appreciation of its remedial value by the framers of that work, and the necessity of a suitable means of administration.

In rescuing Phosphorus from obscurity and neglect, and furnishing the means by which it is safely and efficiently administered, I claim to have given to medicine a therapeutic agent of great value—one which renders many forms of nervous derangements comparatively easy to cure, for which the Materia Medica supplies but few remedies. In the following pages I shall not attempt a systematic description of Phosphorus, assuming its history, chemical characters, tests, and toxicology to be already familiar to the reader. My remarks will therefore be limited to (1) The physiological and pathological relations of Phos-

phorus, and the chemical constitution of the Brain and Nerve Tissues; (2) The medicinal properties of Phosphorus, its remedial value and therapeutic uses; (3) Its pharmacy, and the forms in which it may be given with safety and advantage; (4) A brief review of the general condition known as Loss of Nerve Power, its various manifestations, causes, and treatment, more particularly those which are directly induced by over-work, and certain other exhausting influences incidental to modern life.

CHAPTER I.

THE PHYSIOLOGICAL AND PATHOLOGICAL RELATIONS OF FREE PHOSPHORUS.

Its source.—Place in nature.—Chemical constitution of brain and nerve matter.—Phosphorus not foreign to the organism, but an important alimentary principle necessary to constructive metamorphosis.—Over brain-work and sexual excesses increase its elimination from the system and favour the development of constitutional disease.—Phthisis, etc.—Loss of nerve power.—Cerebral and spinal paresis, etc., etc.

PHOSPHORUS was discovered by Brandt in 1669. "It is never met with in nature in the uncombined state, but it occurs in small proportion, as tricalcic diphosphate, $Ca_3 2PO_4$, as a constituent of the primitive and volcanic rocks, by the gradual disintegration of which it passes into the soil; from the soil it is extracted by plants, which accumulate it—particularly in their seeds—in quantity sufficient for the support of the various animals which they supply with food. In the animal system it is collected in large amount, and when combined with oxygen and calcium, in the form of calcic phosphate (bone phosphate, $Ca_3 2PO_4$), it forms the principal earthy constituent of the bones of the vertebrata. Phosphorus also appears to be essential to the exercise of the higher functions of the animal, since it exists as a never-failing ingredient, in the substance of which the brain and nerves are composed. It is likewise contained in albumen and in fibrin in small proportion, and is present in the form of alkaline and earthy phosphate in the urine and solid excrements of animals. . . . Phosphorus was originally prepared from the salts contained in urine, but it is now obtained almost exclusively from the bones of animals, or from native calcic phosphate."*

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* Miller's *Elements of Chemistry*, vol. ii. p. 283.

Dr. Thudichum, who has made an exhaustive examination of the chemical constitution of the brain (*vide* his Report to the Lords of the Privy Council in 1874, pages 196, 198, 209, 214), says :—.

"It is found that this apparently so simple nerve marrow is a compound and mixture of a large number of heterogeneous principles, arranged in such a manner as to vanish completely from appearance as chemical individuals; the compounds so interpenetrate each other that the resulting material is apparently homogeneous, during life completely so, when seen with high powers of the microscope; and although in death the homogeneity partly vanishes, yet even the appearance of the cylinder axis cannot be utilised chemically at present, and the isolation and recognition of any ingredients is entirely dependent upon most circumstantial chemical proceedings. . . . The great quantity of these matters occurring in the brain forms three groups: The members of one contain five elements, amongst which is phosphorus, hence they may be termed PHOSPHORIZED BODIES. The members of the second group contain four elements, amongst them nitrogen, but no phosphorus, and therefore are termed NITROGENISED BODIES. The members of the third group contain only three elements, carbon, hydrogen, and oxygen, present also in the other two groups, but neither phosphorus nor nitrogen, and may be termed OXYGENISED BODIES.

"The group of the Phosphorised Bodies contains Phosphorus in the form of phosphoric acid, combined proximately with glycerine, so that by chemolysis they all yield glycero-phosphoric acid, but they differ in the manner in which they contain the nitrogen and the acid radicals which constitute the great bulk of their substance, and according to these differences must be divided into sub-groups. We thus obtain the sub-groups of the *kephalines*, *myelines*, and *lecithines*."

Early brain researches contain evidence of many inquiries after the form in which Phosphorus is present in the brain, particularly search after "Phosphorus as such," or

Phosphorus in the metalloid form, was made. But it is now almost certain that the phosphorized organic matters all contain Phosphorus in the form of phosphoric acid combined with glycerine, and yield this nucleus by chemolysis as glycero-phosphoric acid. It is, however, possible that *some* phosphorised matters contain Phosphorus in two forms, of which the second, not yet fully known in particular, is not yet proved to appear as glycero-phosphoric acid by chemolysis, but remains attached to one of the fatty acid radicals of the combination as kephalophosphoric acid.

VAUQUELIN summarised the results of his researches on the brain nerve substance of man and animals as follows :—

The brain is composed of—

1. Two fatty matters which are perhaps identical.
2. Albumen (probably semi-coagulated, and not properly soluble in water).
3. Osmazome.
4. Different salts; amongst them phosphate of lime, phosphate of potash, phosphate of magnesia, and a little common salt.
5. Sulphur.
6. Phosphorus.

He estimated the *quantities*, as far as such matters could then be estimated, as follows :—

1. Water, about	80.00	parts.
2. White Fatty Matter . . .	4·53	,,
3. Red Fatty Matter . . .	0·70	,,
4. Albumen	7·00	,,
5. Osmazome	1·12	,,
6. Phosphorus	1·50	,,
7. Acids, Salts, and Sulphur . .	5·15	,,
	100·00	,,

He also examined the *medulla oblongata* and *spinalis*, and found them analogous in composition to the brain;

but they contained much more fatty matter, and less albumen, osmazome, and water. This he supposed to be the reason why the spinal marrow has greater consistence than the brain.

Thus we see that Phosphorus is a normal constituent of the brain, and a "never-failing ingredient" in all the more important tissues and fluids of the body, and a very important constituent of nerve tissue. It is found to be especially abundant (nearly two per cent.) in the great nerve centres.*

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Phosphorus is, in common with *iron*, *sulphur*, *lime*, and other inorganic constituents, a very important alimentary principle, and whenever the food supply is deficient in this element, or when it is not in proportion to the needs of the economy, deterioration of nervous tissue and nervous force is an inevitable consequence. These inorganic principles enter into the composition of the organs by which the conversion of latent into active force is effected, and it follows that the functional power of the cerebro spinal system, and the nerve of organic life, which presides over

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* The following, according to L'Héritier, is the chemical constitution of the nervous matter, and the relative proportion of its different constituents in individuals of different classes :—

	Infants.	Youths.	Adults.	Aged Persons.	Idiots.
Water	82·79	74·26	72·51	73·85	70·93
Albumen	7·00	10·20	9·40	8·65	8·40
Fat...	3·45	5·30	6·10	4·32	5·00
Osmazome and Salts	5·96	8·59	10·19	12·18	14·42
Phosphorus	0·80	1·65	1·80	1·00	0·85

It is a significant fact that it is found in all animal and vegetable juices, and occurs as phosphates in the mineral kingdom, in which form it is used to increase the fertility of the soil.

It will be remarked that the amount of *Phosphorus* is the greatest at the period of greatest mental vigour ; and that in infancy, old age, and idiotcy the proportion is not above half that which is present during the adolescent and adult periods.

According to Professor BORSARELLI (*Medical Times and Gazette*, Aug. 31, 1861, p. 229), the quantity of Phosphorus in the brain of man varies from 1·352 to 1·790, the medium being triple the amount assigned to this organ by Persoz and Opermann.

the functions of nutrition and secretion, is thrown into disorder when the organs themselves are ill nourished.

"*Food*," says Dr. Bence Jones, "acts both chemically and mechanically: chemically 1st, by furnishing latent force, and 2nd, material for the formation of the organs by which that force is made active. It acts mechanically by the solid part increasing chemical action in the stomach, and by the fluid parts adding to the mass of liquid in the blood, and by the dissolved solids that pass into the blood adding to its specific gravity, and thus altering the osmotic actions throughout the system.

"Food may be divided into water, salt, carbonaceous, and nitrogenous matters. The water and salts do not take a direct part in oxidation and nutrition, but they are indispensable indirectly to the chemical actions by dissolving the active substances, and bringing them into sufficiently close contact for the action to take place. Both carbonaceous and nitrogenous aliments can be acted on by oxygen, and can thus change their latent into active force.

"Hydrogen, carbon, and nitrogen, sulphur, phosphorus, iron, and lime, enter into the composition of the organs by which the conversion of latent into active forces is effected. Ultimately, more or less completely, these elements are themselves acted on by the oxygen, and thus no distinction exists between respiratory and plastic food. *Extreme variations* of these two great chemical actions of oxidation and nutrition that take place in each particle of the body constitute disease." *

The evolution of nervous force is dependent upon alimentation; it is increased or diminished in proportion as this process is perfectly or imperfectly performed. Dr. Flint observes: "When new organic matter is appropriated by the tissues to supply the place of that which has become effete, the mineral substances are deposited with them; and the organic principles, as they become effete, or are transformed into excrementitious substances and dis-

The evolution of nervous force.

* Dr. Bence Jones, *Lectures on Pathology and Therapeutics*, page 10.

charged from the body, are always thrown off in connection with the mineral substances which enter into the composition. This constant discharge of Phosphorus and of inorganic principles, forming as they do an essential part of the organism, necessitates their introduction with the food, in order to maintain the normal constitution of the parts. As these principles are as necessary to the constitution of the body as any other, they must be considered as belonging to the class of alimentary substances." This conclusion is inevitable if alimentation be regarded as the supply of material for the regeneration of the organism.

Waste of Phosphorus induces decay of tissue.

Every part of the organism we have seen is constantly undergoing physiological decay and repair, and this molecular change is a necessary and inevitable condition of life. When the balance is lost, and the destructive process from any cause more than counterbalances the constructive process, whether it be owing to a deficient supply of new material or to excessive activity of function, the result is the same, the organism falls into decay, and its functions are thrown into disorder.

As, therefore, it is essential to the condition which we call HEALTH, that waste be duly compensated by the appropriation of new materials, it follows that if this process fail in *any particular*, we have ill-health as an inevitable consequence; not only are the functions of the body enfeebled or perverted, but organic deterioration takes place, and finally functional activity is completely arrested.

Phosphorus as a food.

Phosphorus is food in precisely the same sense that common salt is food; and it is a notable physiological fact, that those alimentary substances which are richest in this inorganic principle are found to be the best to sustain brain work, renovate nerve tissue, and so to restore nervous energy when enfeebled by disease or temporarily depressed by excessive activity. By the addition of a minute quantity of Phosphorus to our food, we increase its nutritive value and brain sustaining power. The greater the functional activity of brain and nerve the greater the disinte-

gration of nerve tissues, which is always in proportion to the expenditure of nervous energy. It would appear that there is an especial relation between the oxidation of the Phosphorus, the disintegration of tissue, and the amount of force expended.

Pathology affords us many examples of diseases induced by the excessive elimination of Phosphorus from the body; and we have not far to search for abundant evidences that loss of nerve power is the direct consequence of prolonged and excessive activity of the nervous system, whereby the oxidation of Phosphorus is increased, and the nutrition of the brain and spinal cord impaired.

Eliminati of Phospl us in dise

In inflammatory diseases of the brain there is reason to believe that an unusually rapid disintegration of tissue takes place, a marked increase of the alkaline phosphates in the urine being always present. In proof of this may be cited the fact well known to brain-workers, as well as to physicians, that *laborious* mental work, especially if coupled with worry and anxiety, is constantly accompanied with an increased excretion of the Phosphorus compounds.

Unless this excessive waste be compensated, as often no doubt it instinctively is, by an increased consumption of food rich in Phosphorus, and by periods of enforced repose, the nervous centres lose *power*, vitality is lowered, and more or less *nervous exhaustion* and physical prostration is experienced, a state so familiar to hard-working professional and literary men, who know it to be only recovered from by a lengthened period of rest, a cessation from mental labour, long and sound sleep, and nutritious food.

"Additional evidence," says Dr. Carpenter,* "for the belief that the functional activity of the nervous tissue involves disintegration of its tissue by the agency of oxygen is found in the increase of *alkaline phosphates* in the urine when there has been any unusual demand upon the nervous power.

"No other of the soft tissues contain any large amount

* Carpenter's *Principles of Human Physiology.*

of Phosphorus; and the marked increase in these deposits, which has been continually observed to accompany long-continued *wear* of mind (whether by intellectual exertion or by the excitement of the feelings), and which even follows any temporary strain upon its powers, may fairly be attributed to this cause.*

Effects of severe mental exertion.

"The most satisfactory proof is to be found in cases in which there is a periodical demand upon the mental power, as, for example, among clergymen, in the preparation for and discharge of their Sunday duties. This, when the demand for mental exertion is severe, and especially when there is that state of excitability of the nervous system which is frequently co-existent with a diminution of its vigour, is found to be very commonly followed by the appearance of a large quantity of the alkaline phosphates in the urine. And in cases in which constant and severe intellectual exertion has impaired the nutrition of the brain, and has consequently weakened the mental power, it is found that any premature attempt to renew the activity of its exercise causes the reappearance of the excessive phosphatic discharge, indicative of an undue waste of nervous matter."

Abnormal elimination of Phosphorus in disease destroys physical and mental vigour.

The disease known as *spermatorrhœa* (I include in this term all those disorders which are primarily dependent on an abnormal loss of semen) affords us the opportunity of observing the physiological effects of dephosphorized

* It is right to mention that more recent experiments show that it is not alone the phosphates that are increased. Byasson has shown, that under the influence of mental exertion the quantity of urine is increased. He says, "The amount of *urea* was also increased; the quantity of phosphoric acid was increased about one-third, sulphuric acid was more than doubled, and chlorine also."[1]

"These facts have an important bearing upon our knowledge of the effects of mental exertion upon the process of dis-assimilation of the nervous tissue. They show that nearly all of the solid principles contained in the urine are increased in quantity by prolonged intellectual exertion, but they fail to point to any one excrementitious principle, either organic or inorganic, which is specially connected with the physiological wear of the brain."—FLINT, M.D., p. 231, vol. iii., *Physiology of Man.*

[1] Byasson, "Essai sur la Relation qui existe à l'état Physiologique entre l'Activité Cérébrale, et la Composition des Urines," p. 48. Paris, 1868.

blood, and furnishes us with conclusive evidence that excessive waste of Phosphorus is highly injurious to physical and mental vigour. The spermatic fluid is rich in Phosphorus, and its emission from the system, *in whatever manner effected*, when *excessive*, is highly pernicious. Deprived of their proper pabulum, the nervous centres are enfeebled for want of nourishment, and the effects produced in the economy are ultimately precisely those we see resulting from over-work and excessive mental strain. The primal cause of disease is the same in both, and its characteristic is *loss of nerve power*. *Cerebral* and *spinal* paresis, neuralgia, epilepsy, melancholia, etc., are but various manifestations of the same condition, and, if these be neglected, structural changes, softening and paralysis, follow. That the phenomena of disease present in these cases of seminal waste resemble so very closely those induced by severe *mental toil* is very remarkable; but it is borne out by our experience in practice every day, although in the former the effects are usually more pronounced, more lasting, and more difficult to cure than those arising from the latter. Premature failure of intellectual power, loss of memory, impotence, "*nervousness*," depression, irritability, and despondency, are expressions of nervous derangements common to both. We conclude, therefore, that the essential elements of disease in both cases is the same, and blood which is *dephosphorized* is incapable of maintaining in a state of healthy functional activity the great centres of nervous force.

Excessive elimination of Phosphorus engenders disease.

In connection with this subject, it may be well to mention that persons who indulge in sexual excesses (which are always attended with great nervous excitement and overwrought emotions, superadded to a material loss) not only lose mental and physical power earlier in life than others, but frequently suffer from *loss of nerve power*, and are peculiarly liable to diseases affecting the organs of respiration and circulation—phthisis, heart disease, etc.

Effects of sexual excesses.

"I am convinced," says Mr. Acton (whose large experience in the treatment of the disorders in question entitle his

Obstinate disease engendered

opinion to respect), "that many of the most obstinate as well as obscure diseases which the medical man meets with arise from repeated loss; and I am no less certain that hypochondriasis, various forms of indigestion and nervous affections, arise from the same cause."*

"Any warning against sexual dangers would be very incomplete if it did not extend to the excesses too often committed by *married persons* in ignorance of their ill effects. Too frequent emission of the life-giving fluid, and too frequent sexual excitement of the nervous system, are in themselves most destructive."† The result is the same, within the marriage bond as without it. It is certain that excesses are constantly practised in utter ignorance of their consequences; and it is only when the health is seriously impaired, and the patient is compelled to seek advice of his medical attendant, that he first learns that his sufferings arise from excesses unwittingly committed.

Dr. Cotton says: "Of all vices, none are more apt to lead on to consumption than the unnatural or unrestrained indulgence of the sensual passions; and when it occurs in youth, the premature exercise of the sensual passion is extremely destructive. To this cause alone the germs of tubercle are very frequently traceable; and I am convinced that the many bearings of this subject upon physical and mental energies have a much closer and more frequent relationship to phthisical affections than we can ever expect, from their peculiar nature, to see fully demonstrated."

In a paper read before the Medico-Chirurgical Society, by Dr. Smith, entitled "A Statistical Inquiry into the prevalence of numerous conditions affecting the constitution in one thousand phthisical persons when in health,"

* In these days of preventive medicine, when the diffusion of useful knowledge relating to public health is expected to emanate from the profession, should it be concealed that individual health is more frequently destroyed by this than by almost any other cause?

† W. Acton, *Functions and Disorders of the Generative System*, p. 104.

it is stated that "11·6 per cent. of the males had committed sexual excesses; 18·2 per cent. had been addicted to masturbation; and 22 per cent. had suffered from involuntary emissions." More than 50 per cent. of the whole!

"*Menorrhagia, diarrhœa, leucorrhœa,* and *hæmorrhages* and fluxes," says Dr. Williams; "if excessive, reduce the powers of life and the capacity to resist disease." But he adds, "No loss of the kind, however, does so much harm and is of so irreparable a nature as that of the semen. In many of the lower tribes of animals the males live till they copulate, and then die: the reproduction of the species is at the expense of the life of the individual. That our own species is not wholly exempt from this law is apparent from the fact that immoderate venery produces extreme debility and premature decay, and predisposes body and mind to various diseases."

Causes predispos to premat decay of mind and body.

It is unnecessary to pursue the argument further. Enough has been said to show that when, from any cause, Phosphorus is deficient in the organism, the nervous system falls into a condition of *denutrition,* a state highly detrimental to bodily health and mental vigour, and prone to disease.

Thus, in the actions of Phosphorus in disease, as well as in health, we find data for a reasonable explanation of its curative power, and its application in medicine.

When it is introduced into the blood, I believe it directly *promotes nutrition of nerve tissues.* In its administration we only need to be governed by the same principles as in prescribing *iron.* When this iron element is wanting in the organism, of which we see examples every day in cases of anæmia, we think it necessary, in order to restore the processes of nutrition to their normal condition, to administer it *as medicine* until its proportion in the organism reaches its proper standard. Precisely in the same manner, as it seems to me, are we called upon to prescribe Phosphorus, as evidence of its being *wanting* in the organism is quite as easily discerned as are the indications for iron.

As Dr. Bence Jones observes: "It is not possible to draw

any distinction between food and medicine; for oxygen, and iron, and water, and common salt, are as necessary food as starch and gluten or fat and albumen; and increased supply of any substance that can enter into the structure of any tissue as surely promotes nutrition as increased supply of air increases oxidation.

"The most remarkable example of increased nutrition by medicine is seen in the increased formation of blood-globules when iron is taken. The formation of hæmoglobin implies the formation of hæmatin, and without iron no hæmatin is produced; so that iron may be regarded as one food of the blood globules. When it is absorbed in greater quantities than the ordinary food supplies, increased formation of hæmatin occurs; and in cases of anæmia this increased formation may be watched and stopped when it is considered that sufficient red colouring matter has been produced.

"The chemical process by which the iron helps to build up the hæmatin is quite unknown to us, as was a few years since the formation of urea, or any other of the innumerable organic substances which chemistry is now able synthetically to construct; but that the metal itself, and many of its salts, will lead to the increased formation of new blood-globules, is proved by the innumerable preparations of iron that are in use in medicine, no one of which can be said to have an undoubted superiority in the cure of anæmia.

"It is highly probable that other nutritive substances might be found which will specially *promote the nutrition of particular textures, the more nearly in chemical composition the nutritive substance agrees with the texture to be nourished.* Gelatine may perhaps supply the wasting cellular tissue, and even the highest of all textures, the brain and nerve substance, may perhaps be best restored by food of which these substances form a part. That Phosphorus assists in the formation of protagon, as iron does in the formation of blood-globules, is far from any direct proof." *

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* Dr. Bence Jones, *Lectures on Pathology and Therapeutics*, p. 295.

The direct proof which Dr. B. Jones desires, is, I venture to remark, supplied by *clinical experience.* No one who has fairly and conscientiously employed Phosphorus in the various states of the system—to which I have only briefly referred—can doubt but that Phosphorus furnishes us with the means of directly promoting the nutrition of the brain and nerve substances, exactly as he admits that iron favours the formation of new blood-globules. That it assists in the formation of *protagon* is as doubtful as the existence of *protagon* itself.

That it may be directly introduced into the blood can be no more reasonably doubted than that it is necessary to the formation of the phosphorized bodies, which are the essential constituents of healthy brain matter. It is a familiar clinical observation that, if Phosphorus be withheld for a time, when the indications for it are pronounced in a case which is progressing favourably towards recovery, the patient will invariably relapse, and again improve on restoring the Phosphorus.

In a case reported in the *British Medical Journal,* Nov. 13th, 1880, of defective nutrition, which apparently had given rise to congenital malformation, Phosphorus was administered with signal success :—

"A young married lady applied to me to attend her in her confinement. The child, when born, was puny, feeble, never breathed properly, or took proper nourishment. It died in a few days. A second pregnancy ensued; the child of this delivery had terrible convulsive attacks from a few days after birth until its death, at the age of over a year. Its feet were clubbed, its hands twisted, and its spinal column hopelessly curved. A third pregnancy and delivery took place; this third child had hare-lip, cleft palate, club-feet, twists of the hands on to the forearm, in addition to spinal curvature. It lived, if I remember rightly, over a year. The poor mother came to tell me the dread news of her fourth pregnancy. Happening at the time to be much exercised in my mind, on account of an annoying failure I had had in selection or in luck in the breed of horses, I had been reading every available treatise thereupon, and was greedy for every scrap of information. In an American veterinary note, I saw that a farmer down West had used Phosphorus, with marked success, as a medicine given throughout pregnancy to mares who threw malformed foals. I immediately put my patient on a combination of Phosphorus and

Quinine, made by Messrs. Kirby & Co., of Newman Street. She took the pills regularly thrice daily, and a healthy girl was born, when the pills were discontinued. Soon after the confinement, my patient told me she "missed the Phosphorus dreadfully;" and, there being no sign of milk, I sanctioned the resuming of it, and lactation speedily supervened. This child throve well until it caught whooping-cough, when it nearly died from the most severe attack of that malady which I have seen in a child so young; but that it possessed stamina sufficient to withstand the disease (and, perhaps, the treatment, for we left no stone unturned), speaks volumes for its vital power. And, yesterday, a healthy child was again born to her (a son), after nine continuous months of Phosphorus, which, rightly or wrongly, I accredit with having prevailed upon Nature to change the type in this instance. These are the bare facts which seem to me worthy of this much record. To many, no doubt, they will be trite enough, and all may have expected such a result. I was one of those sceptics who 'expected nothing,' and was anything but disappointed."

CHAPTER II.

THE THERAPEUTIC USES AND PHYSIOLOGICAL ACTIONS OF PHOSPHORUS.

In loss of nerve power and in all manifestations of nervous exhaustion.—In cerebral and spinal paresis.—In epilepsy, hysteria, and chorea, and analogous forms of convulsive disorder.—In structural disease of the brain and spinal cord.—Softening and myelitic paraplegia.—In neuralgias.—As a stimulant in adynamic fevers, with prostration and emaciation.—As as restorative to heighten mental activity and muscular power.—As a nutrient tonic in premature senility.—To promote sleep in the aged.—As a substitute for arsenic in skin diseases, etc.

ON this subject much will have been gathered from what has already been stated when treating of the physiological and pathological relations of free Phosphorus. Nevertheless, it will be well, by way of *résumé*, to name particularly the various diseases in which it is found to exert a special remedial power.

In LOSS OF NERVE POWER, and in all the various manifestations of deranged nervous function to which it gives rise, Phosphorus, as we have seen, operates as a powerful restorative. It plays a very important part in the nutrition of brain and nerve tissues, and possesses special vitalizing and energizing properties. It is employed in cerebral and spinal paresis, in melancholia, and in epilepsy, hysteria, and chorea, with considerable advantage.

Use in chorea.

Dr. Radcliffe says: "For the last seven years, also, I have used Phosphorus in the majority of cases of *chorea* in which I have used cod-liver oil, and for the same reason. I asked myself whether the fact that Phosphorus is present in large quantity in the great nerve-centres, and that the amount of this ingredient seems to have some direct relation to the activity of the nervous functions,—being as much as two per cent. in adult life, and below one per cent.

in infants and idiots,—might not show that Phosphorus is specially indicated as food for a weak nervous system, as much indicated, perhaps, as Iron in cases where there is a deficiency of red corpuscles in the blood; and this question once put seemed to require an answer in the affirmative." *

s a tonic in ain and inal eases.

"And," continues Dr. Radcliffe, "in proper doses, Phosphorus produces the very changes which are desired in cases of chorea, and analogous forms of convulsive disorder. Properly watched, it is quite innocent in its action, and may be most beneficial. Of this I am most confident." †

"*The chief use of Phosphorus in medicine*," says Dr. Wood, "*is as a nutrient tonic to the nervous system. In all cases of nervous exhaustion, whether involving the cerebral or spinal centres, it is of great value.* I have seen marked benefit from its use when the symptoms were not severe enough to indicate organic lesion, but *the most remarkable results have been in the cases in which the structure of the centres was apparently deeply implicated.* In threatening cerebral softening, in myelitic paraplegia from excessive venery, it is the only drug which appears really to affect the nerve-centres. In neuralgia, attention has recently been drawn by several writers to its virtues; and as neuralgia is often simply an expression of exhausted nerve-power, the use of Phosphorus is commended by reason as well as by experience. It is probable that it may be of some value in cases of impaired vitality, although the nervous system be not obviously implicated." ‡

cerebral tening d raplegia.

Burgess and Mavor, in their work "On the Therapeutic value of Drugs, as deduced from Experiments on Man and Animals," say:—

seases in ich osphorus ndicated.

"Phosphorus is indicated in the diarrhœa of phthisis, pneumonia, in malignant jaundice, fatty heart, atheroma

* *Reynolds' System of Medicine*, p. 220, *art.* CHOREA.

† Ibid.

‡ Professor H. C. Wood, Clinical Lecturer on Diseases of the Nervous System in the University of Pennsylvania, etc., page 90.

of the arteries, mollites ossium, softening of the brain and spinal cord, nephritis, in atonic conditions of the cerebro-spinal system and muscular weakness in children, irritable weakness of the sexual organs induced by excessive venery, incipient caries, purpura, functional paralysis, adynamic fevers with prostration and emaciation, hectic fever, progressive spinal paralysis, marasmus, general debility, chronic catarrh, arthritic hemicrania, broncho-pneumonia, phthisis pulmonalis in the early stage, gastro-enteritis with emaciation, ulceration, and fistulous ulcers."*

The indication for Phosphorus in this long catalogue of diseases is no doubt based upon the physiological actions of the agent. Whether or not its utility in all of them will be confirmed by clinical experience remains to be seen; in many of them we *know* that it is useful, but it is well to remember that Phosphorus is administered to correct an abnormal condition of the blood,—blood chemically defective in nutritive power; and that this condition is the *origin* of many of the diseases here catalogued, and with the removal of the *cause* it is reasonable to expect that the effects should cease.

"In medicinal doses," Dr. Harley says, "Phosphorus is a *stimulant* to the nervous system, and may be given when there is a tendency to nervous prostration and general enfeeblement, as in the early stages of the palsy of the insane, and cases of cerebral or spinal atrophy."†

"In small doses," wrote Dr. Pereira, "Phosphorus excites the nervous, vascular, and excretory organs. It creates an agreeable feeling of warmth in the epigastrium, increases the fulness and frequency of the pulse, augments the heat of the skin, heightens the mental activity and the muscular power, and operates as a powerful sudorific and diuretic."‡

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* *Therapeutic Value of Drugs*, Baillière, Tindall & Cox. London, 1874.

† J. Harley, *Royle's Manual of Materia Medica and Therapeutics*, page 63. Sixth edition. London, 1876.

‡ Pereira's *Materia Medica.*

The following extracts from a recent work on Materia Medica and Therapeutics are cited chiefly because they bear testimony to the correctness of the opinions which have been repeatedly expressed in earlier editions of this work :—

"*Physiological actions.*—Phosphorus, in ordinary medicinal doses, gives rise to an agreeable sensation of warmth in the stomach. As it undergoes rapid oxidation, much hydrogen is evolved, which, while in its nascent state, combines with a portion of the Phosphorus, forming phosphide of hydrogen. Eructation of this gas is therefore one of the unpleasant effects of Phosphorus administered by the stomach. [And one which may easily be guarded against.—E. A. K.] The action of the heart becomes more frequent, the body temperature rises somewhat, the mental activity and the muscular power increases, the menstrual flow becomes more abundant, aphrodisiac effects are experienced, and the urine and sweat are more freely excreted."

A portion of the Phosphorus taken into the stomach passes into the blood unchanged, most probably in combination with fatty matter.

"The physiological action of Phosphorus in small doses in increasing mental activity finds a therapeutical expression in the use of its preparations in cerebral disorders. It is indicated in pathological states dependent on anæmia, and contra-indicated in vascular congestion and excitement (see page 85). By the use of it we supply to the cerebral substances a material which it requires for the healthy performance of its functions. It acts most beneficially in the cases of wakefulness in which the nutritive functions of the body are wanting in activity. *The wakefulness of the aged*, accompanied with muscular cramps, feebleness of memory, giddiness, and trembling of the voluntary muscles on exertion, is improved by the preparations of Phosphorus. *Early decay of mental powers*, associated with atheromatous changes of the cerebral vessels, and *consequent impaired* nutrition of the brain, is benefitted by min-

ute doses of this agent. "Large doses in these disorders of advanced life are improper and unsafe; the best results are obtained by the persistent use of minute doses. We have no remedy more efficient in the treatment of impotence than Phosphorus." *

The wider our *experience* of the therapeutical effects of Phosphorus extends, the more impressed we become with its value; not only has it the remarkable property of relieving nervous exhaustion, but it also confers the power to endure mental fatigue and an increased capacity for *intellectual* work. If it be impossible at present to explain fully its *modus operandi*, what we know of its chemical relations certainly affords ground for a rational inference that it supplies material needed to compensate waste and to construct tissue disintegrated by functional activity. The greater the activity the greater the waste, and the greater the need of the pabulum required for nutrition.

If it be objected that the use of Phosphorus in many of the diseases for which it is recommended is empirical, and outruns our knowledge of its scientific action, I reply that the same objection may as reasonably be taken to the use of quinine, arsenic, and mercury in the treatment of certain diseases for which they are the reputed specifics. The action of some medicines can only be learned by their operation on *diseased organs*, and it cannot be too often repeated that "simple experience forms the only crucible in which therapeutic fact or doctrine can be fairly tried. Whatever sustains this test may be accepted as a real and permanent addition to our therapeutic resources."†

In TEMPORARY NERVOUS EXHAUSTION.—Whenever the system is jaded by over-work or wearied by unusual mental effort, or suffering under exceptional nervous exhaustion from any cause, Phosphorus will be found to afford immediate relief. In such cases its exhilarating and

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* Robert Bartholow, M.A., M.D., LL.D., Professor of Materia Medica, Jefferson's Medical College, Philadelphia.

† Dr. A. Stille, *Materia Medica*, vol. i., p. 38.

restorative effect is very remarkable. The one-twentieth or one-sixteenth of a grain may be taken either alone or combined with Nux Vomica or with Quinine, with meals. A dose or two quickly produces a sensation of *bien-être*, of comfort and exhilaration, and a manifest *increase of power*. It gives not merely a fillip to the weary and languid brain, but material support, with increased capacity for renewed exertion, while it restores the animal spirits. The effects of Phosphorus are far less evanescent than those of alcoholic stimulants, and are not followed by depression. The employment of Phosphorus in these cases is, however, open to abuse, and the prescriber should guard against this. A dose of Phosphorus may often be administered in place of ammonia or brandy, with much advantage.

In NERVOUS PROSTRATION, which frequently occurs in the latter stages of scarlatina, typhus, and typhoid fevers, pneumonia, and in many other asthenic conditions, Phosphorus may be prescribed as a *special* nerve stimulant, as well as a renovator of nerve tissue and an anti-perditor, with success. Full doses are always necessary. Three grains of Pil. Phosphori Mollis (see page 41) should be ordered every three or four hours, of course watching its effect closely. In these cases it ought to be given boldly, and must not be delayed until the patient is in *articulo mortis*. *To obtain the stimulating effect of Phosphorus quickly*, the pill may be dissolved before it is taken in a little *warm* water (a wineglassful). No better mode can be adopted, whenever it is thought desirable or necessary to give Phosphorus in a fluid form. Theory would lead us to expect good results from a combination of Phosphorus with belladonna in these cases of extreme nervous prostration; in the Formulary a combination will be found which will afford facilities for testing its power.

In SKIN DISEASES.—A large class of cutaneous diseases arise from defective nutrition, and are directly traceable to debility, break-down of the periphral, together with the central nerve power, resulting from over-work and intense anxiety of mind; others are diathetic, and some are purely

neurotic. I would particularise as types, *psoriasis*, *chronic eczema*, and *pruritus*. In those forms of *strumous* and *cachectic* affections of the skin usually treated with arsenic, cod-liver oil, and other nervine tonics, Phosphorus is exceedingly useful. It is to be remembered, that in the treatment of these often obstinate affections, suitable local treatment must never be neglected.

In a paper contributed to the *Dublin Journal of Medical Science*, Dr. Eames speaks of Phosphorus as being more than a substitute for arsenic; he states that he has succeeded in curing cases with it when arsenic entirely failed. In a very severe case of *psoriasis*, occurring in an old gentleman upwards of eighty years of age, I employed Phosphorus and iron, F. 13, with signal advantage.

The two following illustrative cases, selected from Dr. Eames' paper, afford conclusive evidence of the value of Phosphorus, and will be read with interest.

Mrs. X. came under my care on the 1st of March, 1870. She was married, and had one child. When three veils which she wore were removed, there was little difficulty in arriving at the conclusion that she was suffering from acne indurata of a severe type. The eruption was abundant on the chin, which was much swollen and disfigured; also on her cheek, nose, and forehead, and in an aggravated degree in lines leading from the inner canthus of either eye to the commissures of the lips. Four years ago the disease manifested itself by a few spots which appeared on the chin. At this time Mrs. X. was out of health, and as her general condition improved these spots disappeared. Some induration and duskiness of the integument remained, and the malady broke out again some months afterwards. This attack was also slight. After some similar attacks, the disease appeared with extreme violence in November, 1869. She was under treatment from this date till I saw her on the 1st of March. She had become continuously worse, the eruption advancing from the chin to the parts I have mentioned. She felt weak, depressed, easily fatigued. Her tongue was coated; she had nausea in the morning. Her bowels were regular, and her pulse normal; catamenia regular, but rather excessive latterly. She had taken various acids, iron, and arsenic, all without benefit. The spots have been opened, and have been touched with nitrate of silver. I ordered tincture of the perchloride of iron in infusion of calumba, and a lotion of acetate of lead and opium to be applied warm to the face, as there

was great irritation present. Nitro-muriatic acid and pepsine wine were afterwards given, and an ointment containing hypochloride of sulphur was rubbed into the face. She improved slightly under this treatment; but in the beginning of April she became as bad as before. I now determined to try Phosphorus, as there existed considerable nervous depression. It was given dissolved in oil; at the same time she continued to use the hypochloride of sulphur ointment. On April the 29th she was so much improved that she came without a veil. She also felt much stronger, her appetite was excellent, and she took exercise without excessive fatigue. The Phosphorus was taken for six weeks, and she has since remained exempt from the disease.

James F. aged 20, a labourer, of a fine, healthy appearance, never had syphilis. Both parents alive, healthy and temperate. He was admitted into Mercer's Hospital on September 12th, 1871, suffering from severe psoriasis. He was first attacked fourteen months previously. He had during that time been under the able treatment of four medical gentlemen. The disease began as psoriasis guttata on his chest and abdomen. When I examined him I found him almost covered with the eruption from the crown of his head to his feet, the disease being markedly of the diffused variety. He had taken mercury, the perchloride as well as some other salts, iodide of potassium, and, as he affirmed, about a pint of Fowler's solution. Externally, he had used various applications, including the tarry preparations and carbolic acid. He was at once ordered Phosphorus, to take a warm bath every second night, and to rub in carbolic oil. After a fortnight dyspeptic symptoms occurred, which compelled us to discontinue the drug for a week, mineral acids being given. The Phosphorus was then resumed, and the only change made in his treatment was giving him a hot-air bath (Wyatt's) three times a week. He left the hospital on October 21st, almost well. I have since heard that he is quite cured.

It will be observed that *Phosphorated oil* was administered in these cases, and no ill effects are recorded to have followed its use; but in four of the remaining seven cases reported by Dr. Eames, "grave" and "severe" dyspeptic symptoms necessitated the discontinuance of the drug. An improved method of administration affords both encouragement and facilities for a further trial of Phosphorus as a remedy for many obstinate skin affections.

CHAPTER III.

PHARMACEUTICAL PREPARATIONS OF PHOSPHORUS, AND MODE OF ADMINISTRATION.

Ol. Phosphoratum.—Tinctures.—Phosphites and Hypophosphites.—Zinc Phosphide.—Solutio Phosphori Medicati.—Caution against dangerous formulæ still extant.—Phosphorus Pills.—Value of Phosphorus in medicine, on what it depends.—New Preparations: Pil. Phosphori Mollis; Pil. Ferri Phosphorati; Pil. Quiniæ Phosphorati; and their therapeutic uses.

WE now come to consider the best mode of administering this remarkable medicine. Although discovered, as we have seen, in 1669, no formula for its internal administration appeared in the Pharmacopœia until May, 1874, about three years after my preparation, *Pil. Phosphori Mollis*, had been in general use. It is true that several formulæ for the preparation of Phosphorus—pills and solutions—are to be found scattered about in works on Materia Medica; but these formulæ, all more or less defective, are practically of no value, chiefly because impossible to compound correctly. Not a few of these formulæ are positively dangerous, as will be seen on reference to those quoted farther on. The only formulæ bearing impress of authority were those of the Prussian Pharmacopœia (Phosphorated Oil) and of the French Codex (Phosphorated Ether). Both preparations are known to be unstable, and therefore uncertain and dangerous in their operation; they are, moreover, practically objectionable because exceedingly unpleasant to take. It is *not necessary* to exhibit Phosphorus in a fluid vehicle, and it should always be avoided. Tinctures of Phosphorus when made with Ether* or Alcohol are subject to constant

Instability of solutio

* Dr. Garrod says, that Phosphorus given in Ether is apt to form a coating on the tongue, from the evaporation of the menstruum. This. I think, is an error.

variations in strength, owing to evaporation in the one case and to the absorption of water and partial precipitation in the other; when dissolved in Oil (especially in Cod Liver Oil*) the Phosphorus is liable to oxidation, and the mixture is so exceedingly nauseous that patients are with difficulty persuaded to attempt a second dose, and if persevered with, it frequently gives rise to severe gastric derangement. Leaving these very defective preparations, I will now briefly review the other preparations of Phosphorus that are or have been employed.

ypophosites and her compound salts.

Phosphites and Hypophosphites of Soda, Potash, and Lime have been largely employed as a means of introducing Phosphorus into the system; but the reports given by competent observers † are very contradictory. According to some these salts are said to be beneficial, by others to be almost inert. It is certain that no reliance can be placed upon them. Why, it may be asked, should we employ feeble and uncertain compounds, when the element itself in its free state and in precise doses can be easily and safely administered?

Phosphorus has a strong affinity for oxygen, and compounds are quickly formed in the stomach. It is probable that some Phosphorus enters the blood uncombined. Dr. Bartholow says:—"It is certain that the effects of Phosphorus *differ in character from the effects of any of its compounds*. They agree in the property of aiding constructive metamorphosis, but differ widely in other respects."

Phosphide of Zinc has recently been tried, and, it is said, with some success. It is thought by some practitioners to be an effective mode of administering the element. It is, however, admitted to be slow in its action, and occasionally to give rise to violent local disturbance, causing nausea and vomiting.‡ To disengage the Phosphorus, this com-

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* Dr. Broadbent says, that of all methods of giving Phosphorus, *this is the worst*. See *The Practitioner*.

† Dr. Churchill, *Medical Circular*, 1862–63. Dr. Cotton, *Medical Circular*, July, 1861.

‡ W. Ashburton Thompson says of the Phosphide, "It seems to

pound must undergo decomposition; and this occasions considerable digestive disturbance, while in point of therapeutic value it is, I think, even inferior to the hypophosphites, and there certainly is no possible advantage to be gained in prescribing it. It is a point of the utmost practical importance *to prevent the Phosphorus being free in the stomach*, and this cannot be done if it be administered in this form, or in that worst of all forms, in Cod Liver Oil.

Red Amorphous Phosphorus.—This is an allotropic variety of the element. When pure, it contains *no free Phosphorus*. Any remedial value it may possess is due to imperfect isolation, and as this is always more or less incomplete, it should never be prescribed. If pure, its therapeutic value is nil; if impure, the amount of Phosphorus is uncertain, and may be dangerous, this fact probably accounts for the great discrepancy as to the proper dose of this substance as given by different therapeutists, which is found to vary from one-sixth of a grain to ten grains.

Pharmaceutical preparation

Oleum Phosphoratum, *B. P.*, 1874. A solution of Phosphorus in Almond Oil, 10 minims = a fifteenth of a grain of Phosphorus. Of the several fluid preparations hitherto devised, this is undoubtedly the least objectionable. When I have been obliged to prescribe Phosphorus in a fluid form, I have selected this in preference to tinctures. It is a matter of daily experience that patients *will not* be

Liability solution disagree

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take a longer time to effect a cure, or even to alleviate the pain, than either the oil or tincture of Phosphorus; but there is this difference between its action and theirs—that when alleviation of pain is observed, cure generally proceeds with rapidity, while during treatment with either of the solutions, I have frequently observed very speedy alleviation, followed by a comparatively protracted cure." He adds, "I have seen Zinc Phosphide produce actual vomiting in two or three cases: the drug acted simply as an emetic." Solutions of Phosphorus therefore would appear to act chiefly as nerve *stimulants*, and, like other stimulants, to be transient in their effects. To my mind this shows the necessity of administering it in a form which secures slow and continuous absorption.—"On the Use of Phosphorus in Neuralgia," *The Practitioner*, Oct., 1873, p. 272.

ition inst gerous nulæ.

"Before closing, we are bound to advert to some published formulæ worthy to be spoken of as curiosities of pharmacy, except for the fact that some are dangerous. They pass from one book to another unchallenged and without comment, and authors whom we should have thought better informed on the pharmacy of Phosphorus have quoted them, though with what purpose, as they are practically useless, it is difficult to divine. Why perpetuate obsolete prescriptions which are likely to do harm? We have met with some of these in which directions impossible to follow are given. Thus as late as 1873 we actually find this credited to Burgess, in a work on skin diseases: *—

℞. Phosphorus, g. iij. to xx.
Almond oil, gtt. x. to lx.
Powdered acacia, q. s.

Make twelve pills.

Dose: one twice a day. Use in lupus and syphilitic tubercular disease.

"How many persons have been poisoned by this it may be difficult to say. Perhaps the difficulty of dispensing the prescription may have saved some lives, but we are astonished beyond measure to find a careful teacher admitting into his work a formula which is too defective to attempt to prepare. If by some means ten or twenty grains of Phosphorus were got into twelve pills, most assuredly the person who took them would be *poisoned.* Twenty grains of Phosphorus in twelve pills!!

"A very similar formula was for many years a standing dish in Hooper's 'Physician's Vade Mecum.' † In the last edition we are glad to see it omitted. With such formulæ

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* Dr. Tilbury Fox, "Skin Diseases."

† ℞. Phosphori gr. ij.
Ol. caryophylli, ♏. xij.
Pulv. glycyrrhizæ, q. s.

Divide into twelve pills, and give one twice a day, *cautiously increasing the* number!

This pill is recommended "in lupus, obstinate scaly diseases, and syphilitic tubercles."

floating about, we cannot be surprised that Phosphorus acquired the reputation of being a violent irritant poison; but during the last few years Phosphorus has been given right and left, and is taken just like any other tonic in the form of pills, and we hear nothing of poisoning, except in a few solitary cases *in which it has been clearly proved that the dose was excessive or its preparation defective.**

"Nothing can be easier than to make powdered Phosphorus into pills, and we fear that most of the pills in the market are of this sort. Hence they are uncertain, and consequently dangerous. Other specimens are so hard and insoluble, that, as in those of the Pharmacopœia, the absorption of the dose is altogether conjectural."

"Phosphorus should never be administered in the *solid form.* If strictly interpreted," says Dr. Macnamara, "this is perfectly correct, but it is *not* so if it be understood that Phosphorus may not be given *in a pill*, and in my opinion *this is by far the best and safest way of exhibiting it.*"†

Dr. Macnamara recommends pills made of *phosphorized suet* [suet containing about 1% of Phosphorus], covered with gelatine. It will be observed that the Phosphorus in this formula is dissolved, and is therefore wholly free from the objections which apply to other pill preparations which

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* *The Doctor.* Alluding to the pills made by my process, the writer continues:—

"We have examined the pills made by Messrs. H. & T. Kirby. Any one can easily test these. Break up in the fingers and roll together half a dozen of these pills in a dark room, and they will be seen to be luminous, and the phosphorescence may be observed to be uniform throughout the mass. We have watched this for about an hour. Every time the mass is cut or broken, or indented with the nail—in fact, whenever a new surface is exposed,—fresh gleams appear, and this phosphorescence is not in points, but uniformly diffused. The total absence of anything like *particles of Phosphorus* is very satisfactory, and we believe that the method of preparing them must be, as represented, by dissolving the Phosphorus first, and afterwards adding the excipients, so as to preserve throughout the process the advantages of solution."

† Neligan's *Materia Medica*, p. 789.

are made with powdered Phosphorus. The chief objection against Dr. Macnamara's formula is that the *coating* with gelatine *is too rapidly soluble*, and it is difficult to perform satisfactorily. Moreover, as the suet pills dissolve in the stomach, the effect is very similar to that of the *Phosphorus Perles*.

Mr. Ashburton Thompson tells us that Kunkel gave free Phosphorus in the form of pills before 1721. He called them luminous pills; but his process for making them was not published, and died with him. Leroy, in 1798, believed that he had re-discovered Kunkel's method, and he entrusted their manufacture according to it to Charles le Pelletier, a brother of the celebrated Bertrand le Pelletier. But Leroy was so impressed with the danger of giving *unequally divided* Phosphorus, and the mode of preparation in question was so difficult to carry out, that he declined to confide it to any other person.

Many attempts have since been made to make pills from a solution of Phosphorus. Mandl has given an example; other persons have also furnished formulæ from time to time, and all have signally failed.

To administer Phosphorus *successfully* it is absolutely essential that it should be introduced into the system in its free state, that is, *unoxidized;* and this, owing to its affinity for oxygen, is extremely difficult to secure. All the preparations we have reviewed are incapable of securing this; hence the frequent record of failures and disappointments. Enough has been said to show that the greatest circumspection and care should be exercised in prescribing Phosphorus, and the profession should carefully avoid these compounds. None of them (and they are the only ones which have any claim to remedial utility) have been found to answer satisfactorily *the end in view;* they are all uncertain in their action, sometimes acting violently, and at others producing no appreciable effects whatever; some are the more objectionable because they invariably give rise to local disturbance, disorder the digestive function, and distress the patient exceedingly.

The problem which remained to be solved was, how Phosphorus, in its elementary state, could be administered in solution, and yet in a sufficiently solid state to take the form of a pill—because in this form alone can the Phosphorus be perfectly (mechanically) protected against oxidation, it being an object of the very highest importance to convey it into the blood unoxidized. For it is a clinical fact, based upon large experience, that the remedial value of Phosphorus depends wholly on its assimilation in its free state, *i.e., before, and not after, its conversion* into Phosphoric Acid or other Phosphoric compounds.

To supply the means by which this result may be satisfactorily accomplished, I devised several entirely new preparations. These have now been in constant use for the last ten years; they have been subjected to every test—chemical as well as therapeutical—that could possibly be applied to them; and have proved to be thoroughly dependable and free from toxic properties. It is therefore not too much to say that the difficulties which so long beset the administration of Phosphorus are entirely removed.

The most important of these preparations is

Pil. Phosphori Mollis.* This preparation I introduced in 1871, when there was no Pil. Phosphori in the Pharmacopœia. The method adopted in its manufacture closely resembles that employed in the preparation of the official mercurial pill. The Phosphorus is first converted into a *fluid state* by means of heat and powerful solvents, and is then triturated, in an apparatus constructed for the purpose, with suitable excipients, until it is thoroughly incorporated with them, and has acquired the requisite dilution. The mass thus prepared is of a soft consistence, readily soluble in water, holding the Phosphorus unoxidized, mechan-

* Called Mollis to distinguish it from the Pharmacopœial Pil. Phosphori, a hard and insoluble pill, composed of resin and wax. The formula was introduced into the B. P. three years after my formula was published, and was no doubt designed as a substitute for it; but as the pills frequently pass the bowels undissolved, it is very seldom employed, and has no therapeutic value.

ically fixed, but not chemically changed. The Phosphorus being in solution at the time it is mixed with the excipients, is in the finest state of subdivision in which it is possible to produce it, and in this way it is brought into a condition in which it is capable of being completely absorbed into the blood, and the danger of accumulative action is thus entirely avoided, as is also premature oxidation, which commonly occurs when Phosphorus is otherwise administered. Pil. Phosphori possesses the merit of being of uniform composition and strength—fifty grains equalling exactly one grain of unoxidized Phosphorus. The physician is therefore enabled now to prescribe Phosphorus as easily and with as much accuracy as any of the Pharmacopœial pills, and he need not be apprehensive of inducing the toxic effects of the metalloid ; this is practically impossible if this preparation be administered in therapeutic doses only.

The following scale gives the exact doses in which Pil. Phosphori Mollis may be prescribed :—

3	grains	=	$\frac{1}{16}$	grain of Free Phosphorus.	
$2\frac{1}{2}$	,,	=	$\frac{1}{20}$	,,	,,
2	,,	=	$\frac{1}{25}$	,,	,,
$1\frac{1}{2}$	,,	=	$\frac{1}{33}$	,,	,,
1	,,	=	$\frac{1}{50}$	,,	,,
$\frac{1}{2}$	,,	=	$\frac{1}{100}$	,,	,,

Three grains of this pill is the *maximum*, and half a grain the *minimum* dose.*

Pil. Phosphori Mollis possesses yet another advantage. The prescriber may if he think fit combine with it other agents that he may desire to administer *at the same time*,

* Pills of the various strengths given in the above scale are kept ready for use by most dispensing chemists. The pills are covered or *coated* with a thin film of gum, forming a capsule, which renders them perfectly tasteless, a matter of importance in administering so nauseous a medicine as Phosphorus. This coating not only protects the Phosphorus from oxidation by the action of the atmosphere, but is an essential part of the preparation of the pills, as it prevents a too rapid solution of the Phosphorus.

such as Quinine, Iron, Nux Vomica, and many others; provided, of course, that they are not chemically incompatible with Free Phosphorus.

I have appended several formulæ which will be found exceedingly useful to the practitioner. In forming these combinations I have been guided by my long experience of the requirements of practice. They are sufficiently various to meet the most of these; but other combinations can of course be made when needed by the prescriber. Administered in this manner, Phosphorus may always be relied upon to act with uniformity and certainty. When my attention was first directed to this subject in 1871, there was no pharmaceutical preparation of which the same might be said. My discovery was therefore the more valuable as it has added to our *Materia Medica* a medicine especially adapted to the treatment of a large class of nervous disorders (very much on the increase), in which Phosphorus is markedly beneficial, and for which the pharmacopœia furnishes very few remedies.

Action c tain and uniform.

Pil. Phosphori Mollis requires for its preparation experience and very careful manipulation; the process employed is too complex and far too difficult to be undertaken without minute instruction, and it also necessitates a properly constructed apparatus. It cannot therefore be prepared *extemporaneously* by the dispensing chemist, as other pill masses commonly are.

Manufac requires special p cautions

Hitherto it has been only prepared at my sons' laboratory under my *personal* supervision. The success which has attended the administration of Phosphorus, I believe to be due not only to the peculiar form in which the Phosphorus is presented to the absorbents, and the readiness with which it is assimilated, but also to the unremitting care taken to prevent failures by reason of careless or unskilful manipulation. Without these precautions, not only failure but serious accidents would have undoubtedly occurred, and the reputation of the drug would have suffered unfairly; doubt and uncertainty would have still surrounded the therapeutic efficacy of an exceedingly

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valuable remedy, for which we have no substitute in medicine.

Bearing in mind also the exceedingly poisonous properties of Phosphorus, and the great difficulties attending its pharmacy, and its uncertain action when improperly prepared, I have refrained from publishing *the details* of the process, which it would be dangerous to undertake without experience, preferring that its preparation should have my personal supervision. No information, however, that to *the prescriber* is necessary has been concealed. Pil. Phosphori Mollis is as definite a preparation as Pil. Hydrargyri or any other Pharmacopœia pill, and is as easily and safely prescribed. It contains two per cent. of Free Phosphorus. The physician, knowing this, has no difficulty whatever in prescribing it with the utmost precision. Chemical analysis has exposed every ingredient it contains, there is therefore no secret as to its composition. The *modus operandi*, for the reasons already given, is alone reserved. I have therefore hesitated, apart from all other considerations, to publish the details of a chemical process which, although perfectly safe in skilful and competent hands, might, in those of incompetent persons, lead to very serious results. Its preparation is now fenced in by every possible precaution against accident and failure.

As it is so often desirable to combine Iron, Quinine, and Aloes with Phosphorus, the following preparations will afford means of prescribing these agents conveniently; but the substitution of powdered Phosphorus, or Phosphorus in any form, in the place of Pil. Phosphori Mollis, would be highly dangerous. It will be observed that *Pil. Phosphori Mollis* enters into the composition of all, and is the basis of all the pills for which I have given formulæ, and without it they cannot be effectively prepared.

Pil. Ferri Phosphorati (Phosphorised Iron Pill).

Take of Pil. Phosphori Mollis . . . 1 part
Ferri Redacti . . . . . 3 parts
Mix *secundum artem*.

= ½% Free Phosphorus and 75% Reduced Iron; or 1 in 200.

6 grains	=	Free Phosphorus	$\frac{1}{8}$	grain,	Reduced Iron	$4\frac{1}{2}$	grains.
5 „	=	„	„	$\frac{1}{40}$	„	„	$3\frac{3}{4}$	„
4 „	=	„	„	$\frac{1}{60}$	„	„	3	„
2 „	=	„	„	$\frac{1}{100}$	„	„	$1\frac{1}{2}$	„

Dose—For Adults, 4 or 6 grs.; for Children, from 2 to 4 grs.

The process employed in the manufacture of this pill is, *mutatis mutandis*, that adopted in making the simple Phosphorus mass.

The therapeutic uses of Phosphorus have already been discussed, but it will be convenient here to offer a few remarks on,—

REMEDIAL USES OF PHOSPHORISED IRON.—"Reduced iron is a powerful hæmatinic even in small doses, and well adapted to promote the blood-restoring properties of the metal. The absence of astringency renders it peculiarly useful in the treatment of diseases depending on an excess of white blood corpuscles, in which other preparations of iron would not be admissible."* It is to be remembered that in cases where Iron is wanting in the blood it is probable Phosphorus is also deficient; that it is reasonable to believe that when the red globules are reduced one-third or one-half, and the liquor sanguinis is poor in albumen (which is commonly the case in *anæmic* conditions), that the proportion of Phosphorus is of necessity much below the normal standard.

This preparation has proved highly successful in the treatment of nervous affections associated with *impoverished* (*anæmic*) *blood*. In *neuralgia*, *chlorosis*, *chorea*, and cerebro-spinal *anæmia*, it should be preferred to simple Phosphorus. In these cases it stimulates nutrition and the regenerative power of the blood. "*Sanguis moderator nervorum* is an old and true aphorism," says Professor Stillé. "When the constitution of the blood is impaired and deteriorated by a partial loss of the red disks, the energy of nervous movements and their co-ordination are alike im-

* Dr. Garrod's *Therapeutics and Materia Medica.*

paired, and the system falls into irregular action. It displays an unnatural sensibility to external impressions, especially a want of tone, which places it at the mercy of every transient influence, and leads the mind to form exaggerated estimates of pleasurable as well as painful sensations. Muscular quiverings and spasms, fits of fainting, obstinate vomiting, causeless bursts of laughter, or floods of tears, are the common phenomena of anæmic hysteria." The loss of nerve power and of co-ordination which we observe in these and in analogous conditions are doubtless quite as much due to the want of Phosphorus as of Iron. In these cases this combination is a very suitable remedy, recovery taking place more quickly than when Phosphorus or Iron is administered alone. Great gastric debility frequently accompanies these nervous derangements, and food of all kinds is extremely difficult to digest.

In dyspeptic cases I find it advantageous to combine the Alcoholic Extract of Nux Vomica with each dose (F 13), and to prescribe from 10 to 15 minims of dilute Nitro-hydrochloric Acid to be taken an hour before meals. The Phosphorised Iron should be taken in the middle of the meal.

For combinations, see formulæ 8, 9, 13, 17, and 27.

Pil. Quinæ Phosphorati (Phosphorised Quinine Pill).

Take of Pil. Phosphori Mollis . . . 2 parts
Quinæ Sulph. . . . . 2 „
Mix *secundum artem.*

= 1 in 100 of Free Phosphorus, or 1% of Phosphorus and 50% Sulphate of Quinine.

5 grains	=	Free Phosphorus	$\frac{1}{20}$	grain,	Sulphate Quinine	$2\frac{1}{2}$	grains.		
4 „	=	„	„	$\frac{1}{25}$	„	„	„	2	„
3 „	=	„	„	$\frac{1}{33}$	(nearly)	„	„	$1\frac{1}{2}$	„
$2\frac{1}{2}$ „	=	„	„	$\frac{1}{40}$	„	„	„	$1\frac{1}{4}$	„
2 „	=	„	„	$\frac{1}{50}$	„	„	„	1	„
1 „	=	„	„	$\frac{1}{100}$	„	„	„	$\frac{1}{2}$	„

Dose—For Adults, 2 to 5 grs.; Children, 1 to 2 grs.

See also Formulæ 4, 8, 9, 17, 18, and 27.

REMEDIAL USES OF PHOSPHORISED QUININE.—This is prescribed as a restorative with much advantage in asthenic forms of disease, in which it has been usual to employ Quinine alone. It is especially valuable in the treatment of convalescence from fevers and acute and exhausting diseases. In certain forms of *scrofula*, in which we find the muscles soft and flaccid, glands enlarged, eyes inflamed, and the blood impoverished. It is valuable in *chronic bronchitis and phthisis*, when there is rapid wasting and night sweats. See page 84.

Pil. Aloes Phosphorati (Phosphorised Aloes Pill).

Take of Pil. Phosphori Mollis . . . 2 parts
Ext. Aloes Aquosæ . . . 2 ,,
Mix *secundum artem.*

= 1 of Free Phosphorus in 100, or 1% Free Phosphorus and 50% Aqueous Extract of Aloes.

4 grains	=	Free Phosphorus	$\frac{1}{25}$ gr.,	Aqueous Extract Aloes	2 gr.
3 ,,	=	,,	,,	$\frac{1}{33}$ (nearly)	,,	,,	$1\frac{1}{2}$,,
2 ,,	=	,,	,,	$\frac{1}{50}$	,,	,,	1 ,,
1 ,,	=	,,	,,	$\frac{1}{100}$	,,	,,	$\frac{1}{2}$,,

Dose—For Adults, 2 or 3 grs.; Children, 1 to 2 grs.

REMEDIAL USES OF PHOSPHORISED ALOES.—I have found this very serviceable in the treatment of that form of *habitual constipation*, which occurs from mere debility or atony of the colon, in the aged. It is useful also in feeble constitutions, and in atonic dyspepsia. In combination with Iron and Quinine it is given in *amenorrhœa* and *hysteria* with *uterine torpidity* with much advantage.

In small doses (one or two grains) it operates as a gentle stimulant to the stomach and bowels, increasing both digestion and peristaltic action.

Combinations with Quinine, Iron, and Nux Vomica, will be found in the Formulary.

The Advantages of Administering Phosphorus prepared in these forms, in preference to other methods, may be summarized thus:—

(1) The Phosphorus remains UNOXIDIZED and virtually

IN SOLUTION, *i.e.*, in the finest state of subdivision in which it is possible to obtain it.

(2) It is perfectly protected against change by its intimate union with the excipients, and it excites no irritation of the mucous coats of the stomach or intestines.

(3) EXACT and ACCURATE DOSES of the metalloid are easily obtained; each dose is completely isolated and preserved from premature oxidation by the *coating* or covering which surrounds the pill.

(4) The taste of the Phosphorus is perfectly covered; and as it can only escape from the envelope in which each dose is encased *after* it is broken up, and the disintegration of the pill necessarily goes on slowly, the Phosphorus is incorporated with the food with which it is taken, and is absorbed with it in the process of alimentation without undergoing any chemical change or deterioration.

(5) In most cases it is probable that the digestion of the Phosphorus pill is not commenced until after it has left the stomach, and that it is only completed in the duodenum or in the small intestines, because it is not followed, or but very rarely, by eructations of phosphoretted hydrogen which so commonly occurs when Phosphorus is administered in oil or ether, or otherwise improperly prepared, thus affording the most conclusive evidence that the Phosphorus is set free in the stomach, which ought not to occur.

It will now be understood that the pills are only *carriers*, and serve simply to convey the Phosphorus in a condition capable of assimilation to the absorbents by which it is taken up into the blood.

In this manner the system may be brought under the influence of Phosphorus in very much the same way as it is under Mercury by the use of Blue Pill. It is only when Phosphorus is administered in this perfect manner that it exhibits its remedial power, and can be relied upon as an efficient and safe therapeutic agent. It may thus be employed without incurring even the *risk* of inducing those symptoms of poisoning which are of so frequent occurrence

when Phosphorus is administered dissolved in oil or alcohol; as, for example, when it is taken in oil whether enclosed in capsules or not.

In certain morbid conditions of the stomach, the power *to digest* solids appears to be either entirely arrested, or to be so slowly conducted that medicines, as well as food in a solid form, hurriedly pass through the bowels *undissolved* (*see* Atonic Dyspepsia, p. 68). In these very exceptional cases it is better to divide the Phosphorus pills into two or three portions before taking it, or as described on page 30.

CHAPTER IV.

FUNCTIONAL DISORDERS OF THE NERVOUS SYSTEM ARISING FROM OVER-WORK AND THE EXIGENCIES OF MODERN LIFE.

Loss of nerve power, its causes and symptoms.—Cerebral and spinal paresis.—Epilepsy.—Hysteria.—Melancholia.—Neuralgia.—Atonic dyspepsia.—Impotence.

IN these "high-pressure" times loss of nervous power is a very common condition; few indeed there are who have not in a greater or less degree suffered from one or other of the manifold forms in which it is expressed. It is the "complaint" of modern life, every day becoming more and more pronounced and more prevalent. In what walk of life do we *not* find it? It is perhaps, among professional, scientific, and literary men, and men actively engaged in commerce or engrossed in mercantile and financial speculations, that it is most frequently met with; busy brain-workers, women as well as men, who live not by muscle but by brain.

Students and scholars, growing boys and girls, who in addition, perhaps, to inheriting a feeble constitution from their over-worked parents, are, under the modern system of *cram*, trained on the high-pressure *competitive* system,—these, too, are the subjects of loss of nerve power and enfeebled vitality; and sadly too frequently is it in their case the forerunner of constitutional disease.

Again, in the higher walks of life, in the placid regions not only of competency but of affluence; away from work and worry—but it may be not beyond the reach of care and grief, disappointment and sorrow,—here, also, we still find loss of nerve power, expressed by a feeble heart, failing strength, and the premature decline of the *joyousness of youth.*

"Of all the parts which go to make up the wonderful

whole of the human body," says Dr. Hadfield Jones, "there is none to which a deeper and more mysterious interest is attached than to the nervous system. By this we think and move and have our conscious being; in this, if anywhere, inhabits our '*divinæ particula auræ*;' by this we are linked with the outer world, and are capable of affecting and being again affected by the persons and things around us. By this our immaterial acts upon and sways our material part; and by the higher development of this, and its capability for higher actions, man is especially distinguished from the lower creation. All the passions and emotions, all the intellectual efforts, all the perceptions and recollections operate through and on this system. If this be so, is it any wonder that exhaustion should frequently befall this delicate and complex machinery, or that its disorders should be among the most frequent that our fallen nature is doomed to bear? Even under favourable circumstances the nervous system must often be hardly taxed; how much more then will this be the case when sorrow, toil, and anxiety predominate in the lot assigned!"

Functional disturbance of the nervous system is found among the *under*-worked and indolent, as well as the over-worked, although it may not be so frequent. Nothing to do provides the occasion for much self-indulgence, and consequently is the origin of many affections of the nerves; the *far niente* is not always *dolce*, but is saddening and monotonous. As an alternative to stagnation and *ennui*, men—especially those who have been actively engaged in business, and retired early with fortunes—often live in a constant round of entertainments and dissipations, and in an atmosphere of perpetual restless, nervous excitement, which gives neither the brain nor the heart *adequate repose*.

The one great factor of nervous debility is this very *want of sufficient repose*, of physiological *rest*, mental as well as physical, the constant *straining* of nerve and muscle until they become so enfeebled that their recuperative faculty is destroyed.

There are still some other principal causes of loss of nerve force, besides those to which I have already alluded : to these I will briefly advert,—*fast living*, *frequent and rapid railway travelling*, and *defective hygiene.*

By fast living I do not mean *fast* in the sense in which the phrase is commonly employed,—although dissipation and excesses of all kinds are without doubt a frequent cause of loss of nervous force,—but I refer particularly to the now universal practice of *living in a hurry* and incessant *excitement.* The peril which besets us in these busy times, from this cause, is not a fancied but a real one, of which we are witnesses every day.

Thousands of men commence and end their day's work with a rapid, or it may be a slow, tedious, railway journey, lasting on an average from half to three-quarters of an hour or more, and necessitating *four* more or less hurried journeys to and from the station. The hours allotted to business pursuits are necessarily encroached upon by the time absorbed in this ever-recurring to-and-fro journey,—time which might otherwise be devoted to recreation and repose. As a compensation, to be up to the exigencies of the times, men work, think, and act rapidly.

We cannot doubt but that this impetuous haste, which is the character of modern business life, is highly injurious to sound health. It is not so much over-work, as the *speed* at which the work is accomplished, that kills. Men who are too staid to *rush themselves*, are *pushed* on by the rapid movements of those around them, and are compelled to *hurry* to hold their own.

This pushing and rushing of the body, mentally and physically, becomes a habit from which it is not easy to be freed; no periods of rest or repose during work are allowed, except the doubtful one of standing at a public bar in a hurricane of noise and bustle, to stow away as much food as can be struggled into an empty and exhausted stomach in five or ten minutes. The stomach as well as the brain resents this treatment, and, after a time, loss of nerve

power results from the twofold cause—excessive brain activity and impaired nutrition.

"But 'high pressure' is shown even more in our style of work than in our rate of movement. The world is more exacting in its demands from all labourers, except merely manual ones. Success in professional, public, and commercial life demands more strenuous and exhausting toil, sterner concentration, and a more harsh and rigid sacrifice of the amenities which time offers the easy-going, than was formerly the case. The eminent lawyer, the physician in full practice, the minister, and the politician who aspires to be a minister, even the literary workman and eager man of science, are now condemned to an amount and severity of exertion, which forces one after another to break off (or to break down) in mid-career, shattered, paralysed, reduced to premature inaction or senility. What work does for the learned professions, anxiety does for the merchant and the manufacturer. The barrister must make hay while the sun shines, for it shines so late; the physician cannot, in middle life, select among the patients whom he has longed for through the years of youth; while the statesman has to undergo a prolonged pressure to attain what Macaulay calls 'that closely-watched slavery which is dignified with the name of power.' Men who have given up their entire being to this business-labour often lose all capability of a better life, all relish for recreation or contemplation, all true appreciation of leisure when it comes at last; for the faculties of enjoyment, like all others, are apt to grow atrophied with disuse. The successful man too often, with much to retire upon, has nothing to retire to; for literature, science, domestic ties, public and philanthropic interests, nature itself, have been lost sight of during the mad struggle, and these are treasures the key to which soon grows rusty. This ceaselessness and severity of toil gives the prizes of life to men of exceptional physique." *

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* Lecture delivered by Mr. W. M. Greg, Royal Institute.

This is a startling picture of the battle of human life, but it is not overdrawn. Are we not witnesses of the tremendous sacrifices daily made at the shrine of mammon? How many men are compelled to retire from the struggle physically, and often morally, ruined before middle age is attained!

"*Much to retire upon, nothing to retire to!*" Is the goal when reached worth the cost?

Yet this *unnatural* life of struggle, unrest, and of perpetual excitement and effort, with all its perils and forfeitures, has become, either from choice or necessity, the normal state in which most of us live; by an irresistible force it is thrust, *nolens volens*, upon even those who would if they could escape it.

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I would remark, that besides over-work and fast living, there are other *causes* which operate actively in destroying nerve force; one of the most destructive of these, probably, is defective hygiene. Many, either from necessity or ignorance, live in low and damp situations, in close and confined neighbourhoods, in houses ill-constructed, ill-ventilated, and ill-drained, with but a scanty supply of fresh air and sunlight. These causes exist in all large and crowded towns, where the atmosphere is more or less impure and devitalizing. The blood under these conditions becomes impoverished and imperfectly decarbonized, nutrition is imperfectly performed, the functions of organic life are interfered with, and loss of nerve power is here a common complaint.

It is certain that where these evils exist, and are superadded to over-work, worry and anxiety, the tone of the nervous system is lowered, and the breakdown of the general health is the more rapid and certain. It is in such circumstances as these that over-work so frequently provokes intemperance, and that recourse is had to alcoholic stimulants to spur the flagging energies of failing heart and nerve,—a practice, alas! far too common in our day; and one of the worst features of "*life at high pressure.*" If work cannot be done without resort to alcoholic stimu-

lants, it is a sure sign that it is in excess of the strength, and no amount of stimulation will enable a man long to accomplish more than his strength will admit. Artificial stimulants do but hasten and render more inevitable the final breakdown. Hard working and hard drinking but ill agree. By "taking to drink," even constitutions called "fine," cannot long resist the collapse.

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Fevers and acute inflammations (especially when these occur in large and crowded neighbourhoods)—which formerly could only be treated successfully by the lancet and other depletory measures, now assume a low adynamic type, and yield only to an opposite plan of treatment—tonics, support, food, and alcoholic stimulation.

Moreover, it would not be difficult to show that most of the prevalent functional derangements of the heart, liver, and stomach, which bear a variety of *names*, have their origin in a deficiency of power in some one or other of the centres of nerve force.

Says Dr. Hadfield Jones:—"It is difficult to form a decided opinion on the matter; but there seems, I think, reason to entertain the belief that failure of nervous power is much more characteristic of disease of the present day, than of that which prevailed forty years ago. For this there may be various causes: the greater confinement of large numbers of the population within doors, and often in unhealthy rooms or workshops; the harder struggle to be maintained in the battle of life, the greater amount of the *commoda vitæ*—may all tend to increase the susceptibility of the nervous system, and to impair its resisting power. However the exact truth may be, whether the type of disease is altered or not, I hold it to be abundantly clear that the great majority of disorders we have to treat at the present time show more or less marked indications of failure of nervous power; and I believe it to be a matter of great practical moment to keep this steadily in view." *

Loss of nerve power is variously expressed. Age, sex,

* *Functional Diseases of the Nervous System.*

and constitutional idiosyncrasies govern its manifestations. Hence the symptoms are *very various* as well as multiform. One of the earliest to attract the notice of the patient is *weariness*, which is always present, a sense of *tiredness* never *wholly* relieved by repose; he finds it difficult to concentrate or to fix his attention on any subject; he is soon tired; his capacity for mental work is diminished, and less is actually accomplished; errors and omissions creep into his work; the memory fails, and matters requiring the exercise of judgment and thought are postponed and neglected from day to day. *Wakefulness* at night and drowsiness during the day are very constant symptoms. His sleep is restless and disturbed by the cares and anxieties (real or fancied) of the day, the mind is busied and active alike with the small and great affairs of life; "thoughts," he will tell you, will rush like a torrent into his mind, and he cannot sleep or his sleep is broken, and the mornings find him entirely unrefreshed. This wakefulness is always a suspicious circumstance. He who works hard should sleep soundly, and, if he sleep not, much additional work is thrown on the brain, already abnormally active; the nights bring no rest from functional activity nor repair to the organ. *Digestion* is imperfectly accomplished, often with pain and difficulty; the tongue is furred with a creamy white coating, or is preternaturally clean; the liver torpid, and the bowels constipated. The appetite is unnatural and impaired; the heart's action is feeble and often irregular. The patient in time becomes mentally depressed, and has gloomy forebodings of evil. He is indifferent about success in life, which until now was earnestly sought after and worked for. He becomes habitually taciturn and irritable. Amiable by nature, he becomes quarrelsome and fretful, shuns all society, and if married, is cold and indifferent to conjugal affection. The physical symptoms are characteristic of extreme debility—loss of weight, thin blood, loss of colour.

We see how in this manner loss of nerve power culminates in the breakdown of the general health; for although the

nervous system is the first affected, the blood becomes rapidly and seriously impoverished. The result is the production of a greater or less disturbance of all the bodily functions, and a state of chronic invalidism is created, a state which, in men as well as in women, is constantly associated with hysteria, and is the origin of those manifold and multiform obscure nervous diseases that baffle purely medicinal treatment, which after a time subsides into alternately deadening sensibility with chloral or morphia, and rousing it with stimulants.

The sooner it is recognised that no medicinal treatment alone can restore health and vigour in these conditions, the better for the patient and the credit of the profession. No drug or combination of drugs can possibly produce all the changes that must be effected before health can be regained. In these cases it is a *sine quâ non* that the administration of Phosphorus be associated with the intelligent application of the principles briefly outlined under the head of *treatment.* The abstention of all unwholesome *moral* influences, and the substitution of a mode of life in harmony with the well-defined laws of hygiene and physiology, is but the application of reason and common sense to the treatment, without which neither alleviation nor permanent cure can be effected. A description of all the phases of loss of nerve power would far exceed the limits of this work. I purpose, however, to notice briefly a few of its most important manifestations.

CEREBRAL PARESIS.—"By this term I mean," says Dr. Hadfield Jones, "a state in which, without demonstrable organic change, there is a greater or less enfeeblement of the functional power of the brain."

Its causes I have already described as those commonly giving rise to loss of nerve power,—excessive mental or bodily toil, monotony, unhealthy conditions of life, malarious miasmas, exposure to extreme cold or oppressive heat, exhausting discharges from the body, and many others, producing nervous exhaustion. "The action of heat in the producing of languor and general enfeeblement of nervous

power, is a capital fact, and one that I have often thought is by no means sufficiently regarded." Long exposure to excessive heat has sent many men home from India and the Australian colonies invalided with cerebral or spinal paresis.

The treatment consists in the removal of the exciting cause or causes, and in "the employment of all means that can recreate and invigorate nerve power." These are indicated in the next chapter.

Phosphorus, either alone or in combination with strychnia or iron, or with both, is the most efficient medicine. Cod liver oil is also of value in promoting the nutrition of the nervous tissue.

A CASE OF CEREBRAL PARESIS, *complicated with Epilepsy.*—The following illustrative case, communicated to me by Lady M. in the autumn of 1875, is a remarkable instance of Phosphorus not only arresting organic degeneration, but of actually effecting its regeneration. The effect was so immediate and the increase of power so rapidly manifested, that it is impossible to resist the conclusion that Phosphorus in this case acted both as food and medicine. "Great want of nourishment"—a phrase which expressed precisely the condition of the patient—had literally starved the organs of intellectual and organic life, and reduced vitality to its lowest ebb. The case is exceedingly valuable as showing how desirable it is to administer Phosphorus direct in these cases of loss of brain power.

Sir J. M., Bart., 79 years of age, was for thirty years resident in the East. For the last ten years he suffered much from rheumatism. In April, 1872, he went to Bath, to try the effect of the mineral waters, which did him no good, but rather harm, and the consequence was a pulse of forty-two instead of seventy-six; loss of memory followed. He nevertheless continued the Bath waters, as well as a lowering treatment, which brought on a fit of epilepsy. This happened fortunately at 6.30 a.m., in bed. For weeks he suffered dreadful pains in the hip-joints and shoulders. Bromide of Potassium and various other remedies were prescribed. He at last obtained relief from the injection of turpentine, and this was continued every night for six months; but rheumatism more or less persisted. He spent part of the winter of 1873 at Men-

tone, and then returned to London, and passed the autumn and winter in Scotland. After a lapse of fifteen months he had another fit of epilepsy, and then followed a succession of fits; sometimes the tongue was severely bitten. The frequency of these fits began to tell on his strong frame. Dr. Begbie last spring recommended a change from the Bromide of Potassium to the Bromide of Ammonia. He now began to lose all power; his memory failing him dreadfully; he could not stand nor walk; he was obliged to be carried up and down stairs, and was wheeled from room to room; his appetite failed; he lost the power of retention of urine, etc. Softening of the brain was at this time threatening his life, and during the last three weeks of July he was fed like a child, as he lost all power of raising his hand to his mouth. Dr. Begbie now prescribed "Kirby's Unoxidised Phosphorus," formula 5 ($\frac{1}{30}$ gr.), and these pills were commenced on the 29th; on that day the patient was as usual carried up stairs, and put to bed as a child. The following morning, when he was raised in bed, he remained upright (unless supported, he always before fell flat back again). He was now seen by Sir Wm. Jenner (in consultation), who talked with him, and decided that there was not the smallest symptom of softening of the brain, but "great want of nourishment," and he also recommended "Kirby's Unoxidised Phosphorus," which he was told the patient had already commenced. The Phosphorus was regularly taken, and Sir J. M. became strong and sufficiently well to be able to leave for Scotland on the 27th of August, and travel by night without stopping as far as Perth. Sir J. M. has had five epileptic fits since he commenced taking the pills; they were of a much milder type, and the tongue was bitten but once. Instead of hobbling, he can now walk upright; can walk a mile without fatigue; he is gay and bright, reads a great deal, talks and enters into conversation, and is interested in all that goes on about him. His memory at times fails him, but at no time *now* is this of much importance, and he is considered a marvel.

Lady M. concludes by saying: This is a long story, but I am anxious to give you all particulars.

The neuralgic pains and convulsive attacks were doubtless induced by an impoverished condition of blood, and the "*lowering course*" adopted in the attempt to remove the rheumatism. The Bromides are nerve depressants, and I have seen cases in which cerebral and spinal paresis have been induced by the use of them. Long continued, they promote destructive metamorphosis, and are, I am sure, very injurious. The recovery from partial imbecility

and the regaining of brain power was no doubt due to the action of the Phosphorus in promoting constructive metamorphosis.

SPINAL PARESIS.—This is also a condition which is directly induced by overwork, especially physical work, excessive muscular exertion, and also by many of the causes that I have already enumerated as destroyers of nervous energy, particularly *excessive venery* and drink, exposure to wet and cold, nervous shock and excessive fatigue.* These appear to be more frequently concerned in the production of *spinal* than of *cerebral paresis.*

Spinal paresis is, according to Dr. Hadfield Jones, "a more or less paralysed condition not of the cord alone, but of its upward prolongations and development into the basal ganglia of the cerebrum." Its nature and efficient causes are those of *cerebral paresis.* As, however, it affects a different locality, its *phenomena* are of course different.

"Anatomically regarded it is very remarkable how closely the different nervous centres, or parts of a nervous centre, are connected by commissural fibres; and from a pathological point of view the same connection is often very manifest. The general exhaustion induced by excess in venery or by mental or bodily fatigue, the reproduction of neuralgia in weakly persons by bodily exercise, the effect of mental and muscular exertion in producing drowsiness, are examples which show excessive consumption of the nerve-force in one part *weakens it also in others,* and this can only be adequately explained by the intimate commissural connection between the two centres." †

FUNCTIONAL PARALYSIS occurs in both sexes, and at all ages, from infancy to old age. The symptoms vary considerably. Tenderness of the spine, especially its upper portion, great weakness of the legs, numbness in the feet and hands, "pins and needles," a sensible loss of power in the extremities, with partial loss of sensation as

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* See Dr. Gull's case, *Guy's Hospital Reports,* 1858.

† Dr. Hadfield Jones, *Functional Diseases of the Nervous System.*

well as of motor power, hands incapable of grasping firmly, walking effected awkwardly and with difficulty. In some cases there are no head symptoms, and the general health appears little disturbed; in others there is giddiness, headache, nausea, and a general sense of intense exhaustion. When paralysis is established it may be more or less complete, sometimes affecting *both* the upper and lower extremities, and in other cases the lower or the upper only; in others, again, one limb only is affected, and may be the seat of severe neuralgia. The general treatment to be adopted in these cases is indicated in the remarks under that heading in Chapter V. The removal of all exciting causes is of course essential to recovery. The persistent use of Phosphorus in these cases of functional palsy has been attended with great success. The employment of the galvanic current, constant and interrupted, has been found excessively useful.

EPILEPSY AND EPILEPTIC VERTIGO. — "There are two distinct elements to be regarded in the therapeutics of epilepsy. The one is *the diminution or removal of the condition which is the essential element of the disease;* and the other is the mitigation of the paroxysmal symptoms" (REYNOLDS). The treatment of this, like other affections of the cerebro-spinal system, chiefly depends upon the origin and cause of the seizure.

In one hundred and two cases treated by Dr. Hammond, in which evidence was received, the epilepsy originated from the following causes :—

Over mental exertion	17
Venereal excesses	15
Menstrual derangement	10
Anxiety and grief	10
Indigestion	11
Dentition	11

The remaining twenty-eight originated in frights, blows, sunstrokes, fever, etc.

It will be observed that a very large proportion of the ASCERTAINED CAUSES are those which promote deterioration of nervous tissues, and impairment of their functions. In these cases Phosphorus is extremely useful in diminishing or removing "the essential elements" of the disease.

In the treatment of epilepsy, I usually employ Phosphorus in combination with Zinc (F. 15), and find that the attacks become less frequent and less severe as the patient comes fully under the influence of the medicine. In chronic cases even small signs of improvement should encourage us to persevere with the remedy. A course of Phosphorus is necessary for *six or eight months* at least.

In the case given at page 58, although the epilepsy came on at a very advanced stage, the symptoms improved rapidly under the Phosphorus treatment.

Giddiness and persistent headache should never be neglected; they are often the earliest symptoms of an impending epileptic or paralytic seizure, which proper treatment may avert.

HYSTERIA.—"The hysteric state," says Dr. Russell Reynolds, "is essentially one of mental perturbation, and it is brought into existence, if not inherited, by those conditions which are most active in producing disorder of the mind: in the male sex by worry, anxiety, overwork, late hours, accidental injuries, and dissipation; in the female sex by vexatious emotions, want of sympathy or success, disappointed or concealed affection, want of occupation, fear, and morbid conditions or supposed morbid conditions of the reproductive system. . . . It would appear that the nutrition of the whole nervous system is changed, but that change is of such a kind that it passes beyond our power of recognition, except in its physiological or pathological effects. We cannot see degeneration of tissue here or too rapid metamorphosis there, but we can witness the effects of such morbid processes in movement in secretion and nutrition, and we observe some of the ultimate results of such changes in emotion and sensation."

Inasmuch, therefore, that, in its multiform manifestations,

hysteria is a direct expression of exhausted vital power, Phosphorus may usually be employed with much advantage. It is best administered in combination with Zinc and Aloes; or if there be *anæmia*, with Iron and Quinine. (See F. 15, 16, 18, etc.)

The moral and regimenal treatment of hysteria is obviously of great importance, as indeed it is in all cases which exhibit loss of *self-control*. The form that this should take will depend entirely upon the exciting cause to which the affection may be due.

MELANCHOLIA, OR EMOTIONAL INSANITY.—This form of dementia may be properly classed among the induced diseases incidental to modern life. It is often caused by over brain action, and a combination of the very causes which as we have seen produce cerebral paresis.

Dr. S. W. D. Williams,* Medical Superintendent of the Sussex Lunatic Asylum, publishes the following brief *résumé* of six cases treated in the asylum; and as they are illustrative cases and offer invaluable testimony to the remedial action of Phosphorus, I append his report *verbatim*.

CASE 1.—J. F., male, æt. 51 years, married, agricultural labourer. Admitted 6th Sept., 1873. No hereditary taint, but father given to drinking; first attack; has been gradually coming on for twelve months; supposed to be caused by dismissal from employ by a master with whom he had worked for many years. On

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* *Journal of Mental Science*, April, 1874.—Dr. Williams prefaces his report with the following remarks:—"One great objection to the use of Phosphorus is the difficulty of administering it pure. Solutions of the metalloid in oil or ether are extremely unpleasant and nauseous, and this is a very serious objection when dealing with the insane, who are so prone to refuse food and medicine. I have therefore used the pills prepared by Messrs. Kirby & Co. In each case I commenced will one pill = one-thirtieth of a grain, twice a day. This was increased in some cases to three or four pills daily. *None of the toxic effects* described by Dr. Anstie in his interesting case of 'Slight Poisoning from the medical use of Phosphorus' (*Practitioner*) were observed in any of my cases." In Dr. Anstie's case *solid Phosphorus pills* were administered.

admission, he was in a state of pure melancholia, apparently uncomplicated with delusion. His state of wretchedness and misery was pitiable in the extreme, and he was constantly on the look out for some means of destroying himself. His bodily health was fairly good. His nights were almost entirely sleepless, and he was treated after admission with chloral. This gave him temporary relief, but he became worse again, and on the 27th Sept. the chloral was changed for opium and chloric ether; after which he began to refuse his food; and on Nov. 12th, being no better, he was ordered $\frac{1}{80}$ gr. of Phosphorus night and morning. Within a few days the depression became much less, and by Dec. 12th had quite left him.

Result—Recovery.

CASE 2.—J. B., female, æt. 30 years, single. Admitted 6th June, 1873, when she is described as having a restless manner, and constantly wandering about day and night; as having great lowness of spirits without any apparent cause; and as expressing herself as being fearful she shall destroy herself to escape from her misery, although she is unable to assign any cause for her dejection. Menstruation regular; bodily health fairly good. Was treated with chloric ether and opium, and with chloral. The attack lasted seventy days, and on Aug. 17th she was reported as recovered. On Aug. 28th, she relapsed, and remained ill nearly as long, but by Nov. 27th was considered well enough to be brought before the committee for discharge. The excitement attendant on the prospect of regaining her liberty was too much for her, and she relapsed before she could be removed from the asylum. She was now put on Phosphorus, and the attack lasted only twenty-seven days, since when (two months) she has remained cheerful and well.

Result—Recovery.

CASE 3.—J. B., female, æt. 54 years, widowed. Admitted Nov. 15th, 1873. Disease was stated to be hereditary, and to have lasted five months. On admission she was very much depressed, and her expression was one of the most intense anxiety. She stated that she was not fit to live, and that she had a constant desire to commit suicide, but apparently she had no delusion. This case seemed so closely to resemble the two previous ones, that it was hoped the same treatment which had proved useful in those cases would be equally efficacious in this one, and she was consequently ordered Phosphorus soon after her admission. It was persevered in until Jan. 5th, 1874, viz., seven weeks, but without any benefit. She remained in the same state of intense misery as on admission,

and her nights were so sleepless that her general health began to suffer. The Phosphorus was therefore omitted, and she was ordered opium. The benefit was almost immediate, and she is now (Feb. 10th) convalescent.

Result—Failure of Phosphorus. Success of Opium.

[NOTE.—It is to be observed that this case differed from the two preceding ones in the important particular that it was "stated to be hereditary;" and, moreover, the failure of the Phosphorus may in part be explained by the extreme exhaustion produced by "sleepless nights." Opium and chloral would appear to be a necessary adjuvant in such a case.—*E. A. K.*]

CASE 4.—E. T., female, æt. 33 years, single. Admitted Oct. 9th, 1873, in a state of melancholia atonita, with a strong suicidal and homicidal impulse; but little history could be obtained. For some time after admission she remained quiet, but very dejected, and her bodily health being indifferent she was treated with stimulants —Iron and Cod-liver Oil. But though she got stronger in body, she became decidedly worse mentally, and was at times extremely violent, although invariably preserving an aspect of profound dejection. On Nov. 18th, Phosphorus was prescribed, and up to Dec. 20th she so far improved as to be able to employ herself in the laundry; but on that day she began to relapse, and refusing to take the pills, they were not persevered with. Since then there has been no improvement; on the contrary, she becomes in many respects worse.

Result—Partial benefit, not maintained.

[NOTE.—This case is full of encouragement for a more extended trial of Phosphorus in similar cases. The improvement mentally was most marked, and lasted as long as the remedy was taken. Relapse is not at all uncommon in melancholia. Had the Phosphorus been persevered with there is little doubt that ultimate recovery would have resulted.—*E. A. K.*]*

CASE 5.—M. O., female, æt. 27 years. Admitted Feb. 7th, 1874. This is the first attack, and has only lasted ten days, and is stated to be due to excessive attention to her religious duties. On admission she was in a state of religious exaltation, and had

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* Since this note was penned, a larger experience has convinced me that the use of the Phosphorus should be unremittingly persisted in for, it may be, many months. Several cases have come under my notice in which it has been discontinued much too early.

delusions on religious subjects, but in the course of a day or two she became very depressed, and slept but little at night. Chloral gave her rest for a night or two, but soon lost its effect, and opium was tried without benefit; indeed, she seemed to be lapsing into a state of melancholia atonita. On the 17th, Phosphorus was ordered; on the 22nd, she was much improved, and the tongue had the silvery white appearance already described as due to this medicine. This case is still under treatment, and there is every prospect of recovery.

Result—Probable Recovery.

CASE 6.—G. W., male, æt. 39, widower. Admitted July 23rd, 1872. Supposed cause, intemperance both in smoking and drinking. When admitted he was suffering from acute mania, supervening on gradually increasing impairment of the powers of movement in the lower extremities, which had been put down to paralysis, but was evidently due to locomotor ataxy, and was quite independent of the mental symptoms. The mania gradually and ultimately entirely passed away, but the ataxic symptoms slowly increased. He remained sane for many months, indeed up to Dec. 30th last, when he became very depressed, indeed quite melancholic. Phosphorus was therefore ordered, and the mental symptoms have passed off, but there was no improvement in the locomotor ataxy.

NEURALGIA. — The one great characteristic of all varieties of neuralgia is *Debility of the Nervous System*, and whatever tends to produce structural or functional enfeeblement of the nerves induces neuralgia, hence, all the causes that I have named as inducing loss of nerve power may be cited as causes of neuralgia.

This affection, when not directly the result of some physical cause interfering with the integrity of the nerve itself in which the pain is situated, is invariably due to loss of nerve power. Its very existence is evidence of deficient energy. The remote factor may be *malaria*, *syphilis*, *rheumatism*, *gout* or any other cause capable of *devitalizing* the organism, and as a consequence that of the *nerves* also (HAMMOND).*

Our remedial measures should be therefore directed

* *Diseases of the Nervous System*, page 833.

principally to improving the nutrition of the nervous system generally, and to the removal of any constitutional taint that may be present.

The first indication is filled by simple Phosphorus and Phosphorized Iron, and a generous diet. In *facial* NEURALGIA and *brow ague* it should be combined with Quinine (see *Phosphorized Quinine*), and if malarial influence be suspected, full doses of Quinine should be given. The Phosphorus treatment is applicable to SCIATIC and SPINAL NEURALGIAS. Local disturbance, arising from a loaded colon or irritable condition of the uterus or ovaries, will require special treatment. The constitutional condition must also be taken into account. If syphilitic taint be suspected, Iodide of Potassium should be prescribed.

Neuralgia in men is frequently an expression of loss of nerve power, and the direct consequence of dissipation and excesses of various kinds,—but over-work and intense intellectual exertion will also produce it. Where the pain is located is of little moment, the treatment must be general. Phosphorus and Nux Vomica (Formulæ 6 and 24), are remedies which seldom fail to give relief.

Women suffer more frequently and more intensely from neuralgia than men; they are liable to be affected by all the causes which induce it in men besides the derangement of health associated with menstruation,—menorrhagia, especially. Hyperfecundation,—rapid child-bearing,—frequent miscarriage, hæmorrhage, prolonged lactation, and changes occurring at the climacteric period of life, all tend to induce a neuralgic condition of the nerves. In these cases as in others the general treatment should be directed to the removal of the cause, whenever this is possible. During paroxysms of great pain—Opium and Aconite may be employed as palliatives. The best mode of administering these is by hypodermic injection. The *sixth* of a grain of the *Sulphate of Morphia*, with the $\frac{1}{60}$ gr. of Atropia, will usually succeed in arresting a severe paroxysm of pain, and inducing sleep. The liniment or strong tincture of Aconite may be applied locally.

A full, nutritious diet, with a fair allowance of wine, is a necessary part of the treatment of all forms of Neuralgia.

NERVOUS INDIGESTION.—Described in medical works under various appellations—*atonic dyspepsia, neuroses of the stomach*, etc., is a malady arising from cerebro-spinal exhaustion and impaired nutrition. It is one of the commonest disorders, and, excluding the forms of indigestion arising directly from improper food and the abuse of alcohol, it is perhaps *the* most common of all forms of dyspepsia.

The processes of digestion and assimilation are almost wholly controlled by the nerve of organic life, and when from any cause this centre of nerve force is enfeebled, want of tone is at once manifested by the imperfect performance of the important functions involved. It is a matter of common experience, not only of doctors, but of all classes of brain-workers, as well as men actively engaged in business and exposed to its worries and anxieties, that digestion is greatly affected by the state of the mind at the time when food is taken. There can be no doubt that this important function is lowered by mental emotions and passions—grief, anger, and fear. The natural secretions may become suddenly interrupted, and digestion partially or wholly arrested, causing nausea and pain after taking food. Habitual over-work, combined with care and anxiety, exercises a very depressing influence on the nervous centres; hence indigestion, the bane of professional life, is a common expression of want of nervous power. The treatment necessitates the removal of the cause. The history of the case generally discloses great errors in the mode of life, some of which may be perhaps removed. Mental work should be lightened, and the mind relieved as far as possible from difficulties and anxieties. Wholesome open-air physical exercise, horse-riding, lawn tennis, etc., should be encouraged. Railway journeys to and from business must be discontinued. The perpetual hurrying to and from the stations, and the constantly recurring anxiety to *catch the train*,—are self-imposed injuries, and may

certainly be removed for a time at least. The increasing prevalence of heart disease is I believe in part attributable to these causes.

The object of the treatment being to rouse vital energy and to increase nerve power, Phosphorus is invaluable. It may be given either alone or in combination with other medicines, notably with nux vomica, aloes, quinine, and iron. Immediate relief is afforded, if there be much depression and acidity, by a draught containing ammon. sesquicarb. gr. iv., sp. chloroformi ♏ x., inf. gent. co. ʒ j., taken twice a day before meals. The liver and bowels should be acted upon occasionally by alterative doses of podophyllin and rhubarb, F. 119. (See Formulary, page 96.) In severe cases of dyspepsia the appetite is lessened; the solvent power of the juices of the stomach is seriously diminished; solids are wholly or in part undissolved; severe pain often occurs after taking food, which is sometimes rejected by vomiting an hour or two after it has been taken. Indigestion from debility is induced by all the causes I have named as directly inducing loss of nerve power,—over-work, fast living, excesses, and unwholesome conditions of life. It is also a disease of old age, and one of the first to manifest itself in premature senility. Imperfect mastication of food greatly increases the work of the stomach, and it is therefore desirable, when it is occasioned by the loss of teeth, to avoid solid animal food. (See page 75.)

IMPOTENCE.—This term is given to all those morbid conditions which are opposed to the physiological union of the two sexes. It is a subject, therefore, that cannot be fully discussed here. Its occurrence, however, as a symptom of the *morbid condition* of the nervous centres induced by over brain-work, is by no means unusual, and it may be classed as one of the many manifestations of *loss of nerve power*, the causes of which have already been discussed.

In estimating the importance of this condition, it will be necessary to bear in mind that the sexual instinct is not physiologically developed in all to an equal degree: in some it is strong, while in others it is feeble. Great natural

differences exist in this respect, and these are quite consistent with perfect health. *Both extremes* are abnormal, they are generally the outcome of a derangement of the nervous system, and disappear as soon as the nervous malady is removed.

When *impotence* occurs in middle age, it is usually associated with a general loss of nervous power, and is cured by appropriate treatment directed to remove *the original cause* of debility. But if, after recovery of general health and muscular power, this condition still remains, special treatment for its removal is necessary. Permanent impotence in any case is not to be hastily assumed.

Nervous men are easily alarmed; and the *fear* of losing virile power permanently occasions much mental distress, and has a very depressing effect. These cases, as a rule, yield readily to the Phosphorus treatment and to a regimen directed to exalt the tone of the nervous system. Formulæ 6, 9, 11, 20, and 30 are all suitable medicines. In obstinate cases, electricity—Faradisation and the continuous current—properly applied, may be added to the treatment. By these means, and by the exercise of self-control on the part of the patient, impotence is speedily cured. There is, however, a form of impotence which occurs in early manhood, which is directly induced by self-abuse and other vicious habits and practices. These cases need a longer course of treatment and much watchfulness and moral control. The mental and physical condition of such patients is one of extreme feebleness, and their treatment should be always conducted under the immediate observation of their own medical adviser.

The wretched, enfeebled state of mind into which some of these patients fall, renders them an easy prey to extortionate charlatans. By consulting "their own family doctor," they not only secure the advice of one who is best qualified to give it, but the counsel of a friend and confidant.

CHAPTER V.

GENERAL REMARKS ON TREATMENT OF LOSS OF NERVE POWER AND ITS VARIOUS MANIFESTATIONS. REGIMEN AND DIET.

Preliminary treatment.—The importance of observing strictly hygienic rules of life.—Diet.—Value of animal food.—Pulvis Carnis Bovis, its advantages, etc.—Alcoholic drinks, when necessary.—Tobacco. —Sleep.—Rest.—Change of air.—The advantages of travel, etc.

IN the treatment of the various phases of loss of nervous power which we have briefly reviewed, the same general principles must be observed.

In the first place, we must endeavour to discover the causes that are or have been in operation. To this end we should obtain from the patient a faithful history of the case, and this should be given *unreservedly;* for without a clear insight into *the origin* of the disorder, our treatment will probably leave undisturbed the essential element of the disease, and the patient will not progress satisfactorily, however otherwise judicious our treatment may be.

Assuming, then, the causes to be ascertained, the patient will be advised as to the regimen to be adopted; and this of course will be directed to arrest any present waste of nervous energy, and to husband generally his strength by securing rest and by avoiding fatigue. This will necessitate regulations and prohibitions, as to work and mode of life, such as the circumstances of the case may demand.

In severe cases an *entire cessation* from mental work of a laborious kind, or a complete change of the subject of it, *will be necessary;* but in every case the strain must be lessened, the *tension* relieved,—all sources of nervous fatigue, not to say exhaustion, must be shut off. *Rest* must be *fairly* proportioned to work. Freedom from anxiety, worry, excitement, and emotional disturbance of

every kind, should be prescribed, and as far as practicable the *prescription should be obeyed.*

The next point is to determine the medical treatment. Now the medicines which aid us most efficiently to restore nervous power are: *phosphorus, quinine, iron, strychnia, nux vomica, arsenic, zinc,* and *digitalis.* These are all direct restoratives.

Some tone, while others stimulate, the nervous system. Practically they may be all regarded as direct tonics. Iron and Phosphorus having the advantage of being nutrients also, and are essential to the formative process. *Opium, henbane, conium, chloral,* and the *bromide salts* are, by their sedative, *rest-giving* properties, extremely valuable agents as restorers of nerve power. Apart from Phosphorus, it is not my intention to enlarge upon the therapeutic properties of these drugs; they are familiar to the medical reader. The discovery of the therapeutic uses and value of Phosphorus is comparatively of recent date, and to many practitioners its power is still unknown; to some perhaps as useless, because, not less than other mortals, medical men are often governed by prejudice and routine. But the fact remains that for the conditions under consideration it is the most efficient, and in some cases the only, remedy we possess, and to neglect its administration is to court failure in their treatment. No case, not even that of softening or paralysis, should be regarded as HOPELESS until Phosphorus has been *fairly tried.*

Administered pure and simple, or in combination with one or more of the drugs we have named, Phosphorus supplies us with the best and most direct means, as far as medicine possibly can, of restoring nerve power, however enfeebled. The physiological actions of Phosphorus cannot be produced by the administration of any other drug.

In the Formulary appended, it will be found that I have grouped several medicines together in one prescription. This is done because it is found in practice to be often desirable to administer two or more medicines in combination at the same time. We may in this manner answer two

or three indications at one time: thus, the administration of iron *with Phosphorus* is very beneficial in cases of anæmia associated with a weakly condition of the nervous system. The addition of strychnia or digitalis to Phosphorus is also very valuable in cases of *muscular debility* and in *feeble heart*—now a very common complaint. When these *combinations* are not required, or the groupings of the doses unsuitable, the simple Phosphorus can always be prescribed separately, and such other medicines as may be needed made to form the subjects of second prescriptions.

To each formula I have appended a note, indicating by name the cases in which the particular combination has been found to act beneficially. In the selection of the formula best suited to meet the requirements of particular cases, the prescriber will be guided by his own experience.

Before commencing the Phosphorus treatment, and indeed during its progress, special attention should be paid to what is called the general health of the patient—the regular action of the bowels, the condition of the digestive functions, the due performance of the biliary and renal secretions. These must be carefully observed, and functional derangements corrected by suitable remedies (*see* Miscellaneous Formulæ, page 96). Prelim treatm

HABITUAL CONSTIPATION is a very constant concomitant of nervous disorders, and the cause of much mischief as well as discomfort, and it is essential that it be corrected. Frequently this condition is simply due to want of tone in the muscular coat of the large bowel. When this is so, it is relieved by adding nux vomica or strychnia to each dose of Phosphorus (*see* Formulæ 2, 6, 13, and 28). When constipation occurs from a diminished secretion of bile, a mild mercurial may be administered occasionally, or a small dose of podophyllin may be taken every other night as an alterative (*see* Miscellaneous Formulæ, Nos. 10, 63, 28, 70; also 170, a combination of aloes and nux vomica which may be taken as a dinner pill, as required, without interfering with a course of Phosphorus).

PORTAL CONGESTION is another condition very com-

monly met with in persons overworked and leading a sedentary life, and it is not unfrequently associated with hæmorrhoids; this condition should be relieved by active aperient medicine. Formulæ 163 and 141 (*see* Miscellaneous Formulæ) are suitable medicines. In all cases the bowels should be acted upon at least once a day, and an occasional dose of aperient medicine is desirable. Much of what it is now the fashion to call suppressed gout is, in fact, plethora of the portal and hepatic veins, and the retention in the blood of urea and the products of waste tissue (*see* Note to Formula 163).

DIET.—No satisfactory repair of diseased and wasting tissues can take place without a suitable supply of healthy blood, and healthy blood is the product of proper foods and *normal* digestion and assimilation. The subject of diet, therefore, should always demand our earnest attention, and never be left to chance, but occupy a prominent place in the treatment of all Wasting Diseases.

By far the most important article of animal diet for the sick is Beef, the composition of which, according to Moleschott's mean of Continental analysis is as follows:—

Water	73·4
Soluble Albumen and Hæmatin	2·25
Insoluble Albuminous Substances	15·2
Gelatinous Substances	3·3
Fat	2·87
Extractive Matters	1·38
Creatine	0·068
Ash	1·6

The ash contains chlorides of sodium and potassium, potash, soda, lime, magnesia, iron (phosphate), phosphoric and sulphuric acids, chlorine, and *silica.*

By cooking, about 20 per cent. of its water is lost. According to Parkes, cooked meat stands thus:—

Water	54·
Albuminoids	27·6
Fats	15·45
Salts	2·95

By these analyses it will be seen that beef contains alimentary principles the most important for the nutrition of the body. With a view to give increased facilities for the employment of this most important article in medicine, and to bring it into a suitable state, available under all conditions, at all times and seasons, for the sick and aged, I conceived the idea of condensing it by extracting its water (its putrescent element), and of replacing it by a *dry* alimentary substance, so as to preserve the whole of its nutritious substance in a highly digestible form.

The results of my experiments are in the highest degree satisfactory, and the finest English beef may now be had in a state of powder (containing only about 8 per cent. of water), possessing, perfectly preserved, the whole of the nutritive blood-forming properties of fresh beef.

In the process, which is conducted *without heat*, a certain proportion of farina (fine wheaten flour) is employed ; and this remains intimately incorporated with the meat, thereby adding to its nutritive properties the one only element wanted to render it PERFECT FOOD.

Pulvis Carnis Bovis, by which name I have designated this compound, is much more nutritious than the Extract. Weight for weight, it is three times as nourishing as butcher's meat, and is specially valuable where bulky food is objectionable, whilst its requiring no mastication is an important advantage to the aged and dyspeptic, who may take animal food in this form when they can digest it in no other.

By the addition of water (10 ounces* to 2 ounces of the powder), and boiling for 10 or 15 minutes, half a pint of excellent broth is produced, containing *all* the nutritive properties (the albuminoids and the salts) of 6 ounces of lean meat, plus 1½ ounces of wheaten flour (equal to about

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* Where this amount of fluid is objectionable, one-half the above quantity will suffice, the product being, in that case, a strong meat panada, the flavouring of which may be that most pleasant to the patient.

2 ounces of bread), the whole in a form easily digested and convertible into healthy blood.

It is not my intention here to enlarge on the value of this new aliment devised for invalid dietary. I have referred to it here principally because, in prescribing diet for persons suffering from nervous exhaustion, we often have the greatest difficulty in securing efficient and satisfactory alimentation. *Pulvis Carnis Bovis* places at our disposal a food possessing physiological qualities that cannot fail to render signal service to PRACTICAL THERAPEUTICS.

Patients suffering from loss of nerve power, however manifested, usually require good, nutritious food, and we should take care that it is taken in sufficient quantity. Nature makes a provision for disposing of an excess of food, but no compensation for insufficiency.

Fresh beef, well but not over dressed, or mutton if preferred, game or poultry, fresh vegetables,* a liberal allowance of cream, butter, and other animal fats, are all admissible. Eggs are very digestible, and when quite fresh and lightly cooked are highly nutritious. In cases of physical as well as nervous debility, half a dozen may be taken daily. They may be taken raw, either alone or beaten up with milk, sherry, or brandy. Lightly poached on spinach, they make a dainty dish.

Breakfast. For breakfast, *fresh fish* of all kinds are desirable; coffee, tea, or cocoa may be taken. Coffee is an agreeable stimulant, and, if not too exciting, is more refreshing than either cocoa or tea. The latter (not green tea) may, however, be taken, if preferred, but not more than once or twice a day. The *quantity*, as well as the kind of food, must, however, be determined in a great measure by the digestive power of the patient. Over-feeding, *i.e.*, taking more than is easily digested, is especially to be guarded against. Nervous patients, as a rule, are dyspeptic, their digestive power is feeble, indigestion creates great discom-

* Not always admissible in acute dyspepsia.

fort, and occasions mental depression. Farinaceous or leguminous substances, such as haricot or lentil meals, cooked in good stock or meat broth, or in milk, make a very suitable mid-day meal, and will be found to be better than solid animal food. The extract of meat (Liebig's) has very little nutritive value, but nevertheless is light and refreshing ; and when nervous exhaustion is very marked, a cup of hot broth made with it may be taken at any time during the day or night with a dose of Phosphorus. Heavy dinners are *great evils.* The digestion is disturbed if the patient partake too freely of made dishes. These prevent rather than favour nutrition, and, in my experience, are highly injurious. Great meat eaters and great beer drinkers should be warned that both are injurious when taken in excess of the requirements of the body. Highly-seasoned dishes and great mixtures of food induce plethora, embarrass the circulation, and congest the liver; the excretory organs are thus unnecessarily overtaxed. The quantity of animal food should be regulated not altogether by the appetite, but by the assimilative power which, owing to lowered nervous energy, is often feeble, as has been already observed. When the dinner is taken in "the middle of the day," a light supper should be taken before going to rest. Sleeplessness is often induced by want of food, and it is a good plan to dine early, and to partake of a light but sufficient supper, at least two hours before retiring for the night. If late dinner be taken, *great moderation* should be observed.

Lunch

Dinner

It has become the practice to decry the use of alcohol in disease as well as in health. This I believe to be a mistake. The *moderate* use of wine and beer, rather than *total abstinence,* is in many cases of debility not only desirable, but necessary. It is, of course, a fatal error *to seek relief* from nervous depression by taking alcoholic stimulants in any form. Unhappily it is far too common a practice, and one that should always be discountenanced by the practitioner, for it frequently leads to chronic intemperance. There are, however, some exceptional cases,—*cerebral*

Alcoholic drink and a

paresis, for instance, in which patients are much benefited by a liberal allowance of *good wine*. The habitual use of alcohol, if excessive, is, no doubt, a destroyer of nerve-power, and its use is only to be permitted as a medicine when a stimulant is required, and the quantity allowed should then be defined, and not exceeded.

Tobacco a depressant.

Tobacco operates as a depressor of nerve force; it is a powerful sedative, and for this reason should be used with great moderation, *if at all*, and the practice of constant smoking should be abandoned. The influence of habit must, however, be taken into account.

More sleep required than in health.

Want of sleep, we have already seen, is one of the earliest symptoms of a fatigued and overworked brain. It is one of the first that is relieved by Phosphorus, this I regard as a very significant fact, indicating the favourable action of the agent. The importance of securing your patient sound sleep will be at once apparent when we call to mind that while simple repose suffices to relieve fatigue of the muscles, sound sleep, and sound sleep alone, relieves fatigue of the brain. Without it there can be no rest for the organ and no repair of its tissue.* When, therefore, want of sleep is a prominent feature in the case, little progress can be made towards regaining health and nerve power. If, therefore, sleep be not speedily induced by the Phosphorus treatment, as it very generally is, Formulæ 88, 89, 177 (*see* Formulary), a dose of chloral, or a combination of it with Indian hemp and morphia (Formula 186), may be ordered to be taken at bed time. If there be much nervous irritability and restless excitement, the bromide of ammonium seldom fails to produce refreshing sleep. It may be given in 30 grain doses.

Baths.

The daily use of the bath, cold or tepid, according to the constitution and habits of the patient, should be encouraged. *Cold*, either plunge, douche, or sponge, should be preferred. The Turkish bath supplies us with an exceedingly valuable means of treatment. I have employed it in

The Turkish bath, when beneficial.

* Flint's *Physiology*, vol. iv. p. 459.

melancholia with unmistakable advantage. In cases complicated with gout or rheumatism it ought not to be omitted. Indeed, it may always be safely prescribed when there is no heart disease. I know no agent which so quickly relieves fatigue and *malaise* induced by a hard day's work, whether mental or physical, as the Turkish bath. Always avoid, however, the *heroic* bath and great extremes. Exposure to a temperature of 150° Fahr. for from thirty to fifty minutes, followed by shampooing and a cold or tepid douche, is all that is necessary.

Impor of earl hours regula habits

The observance of *early hours* and the renouncement of *dissipation of all kinds* should be enjoined. Entertainments, whether theatres or evening parties, involving late hours, loss of rest, and nervous excitement are, of course, to be avoided, as these things all directly or indirectly fatigue the nervous system.

Exerc

Regular exercise, walking, rowing, riding on horseback in the open air, should be recommended as a necessary part of the treatment. Many men whose busy brains have been closely engaged in financial or commercial schemes during long business hours, keep their brains still busily engaged at night, changing the subject of excitement; and not a few add to this the exciting vice of gambling, a vile practice, which robs the brain of *necessary repose*, and increases the "wear and tear" tenfold more than wholesome work.

Rest, of air scene.

PHYSIOLOGICAL REST.—I have already said that absolute repose is a necessary condition to the nutrition of the brain, and that this is chiefly to be secured by promoting natural sleep. But rest may be secured during the day as well as by night, by abstention from the particular occupation which has already too exclusively engaged the mind, and also by *mental* distractions and occupations of a pleasurable kind. *Change of air and scene* assist us here, and in many cases they are essential to recovery. In threatenied softening of the brain from over-work, no treatment will avail unless supplemented by a *complete cessation* from work, and by frequent change of scene and occupation. In the treatment of general loss of nerve-

power, or that milder form of it popularly called "*below par*" and "*used up*," this is desirable. Complete rest from *professional or business pursuits* is a *sine quâ non*, and whenever practicable, it should be associated with a change of some sort.

Recreation desirable.

In cerebral paresis, supervening on excessive mental application, mere cessation from the routine of daily duties is insufficient. The brain needs wholesome *exercise* as well as repose, and this is, perhaps, better attained by *new* and pleasurable occupations than by a do-nothing mode of life which is very soon irksome to active minds. Here travel is found to be a powerful restorer of nerve-power and energy. It calls into play faculties and emotions of the mind which may have long lain dormant, and reposes others that have been overstrained and weakened. A short sea-trip, or three weeks in the Engadine, is very desirable when it can be had. New occupations, provided they be quite different in character from what has gone before, afford real rest to a mind that has been too exclusively occupied with one subject. The symptoms and history of the case will help us to advise specifically on this subject.

FORMULARY

AND

THERAPEUTICAL ANNOTATIONS.

PREPARATIONS OF PHOSPHORUS.

No. of Formula.		Strength.	
1	Pil. Phosphori	= gr. $\frac{1}{33}$	Free Phos.
2	Pil. Phosphori et Nucis Vomicæ . .	= gr. $\frac{1}{100}$	,,
3	Pil. Phosphori c. Quinâ	= gr. $\frac{1}{60}$	,,
4	Pil. Phosphori c. Quinâ et Nuce Vom. .	= gr. $\frac{1}{60}$	,,
5	Pil. Phosphori Fort.	= gr. $\frac{1}{20}$	,,
6	Pil. Phosphori et Nucis Vom. Fort. . .	= gr. $\frac{1}{33}$	,,
7	Pil. Phosphori c. Ferro	= gr. $\frac{1}{60}$	,,
8	Pil. Phosphori c. Ferro et Quinâ . .	= gr. $\frac{1}{60}$	,,
9	Pil. Phosphori Comp. [c. Ferro, Quinâ, et Strychniâ]	= gr. $\frac{1}{60}$	,,
10	Pil. Phosphori c. Morphiâ et Zinci Valer. .	= gr. $\frac{1}{25}$	,,
11	Pil. Phosphori et Aconiti	= gr. $\frac{1}{60}$	,,
12	Pil. Phosphori c. Cannabis Ind. . .	= gr. $\frac{1}{25}$	,,
13	Pil. Phosphori c. Ferro et Nuce Vom. .	= gr. $\frac{1}{33}$	,,
14	Pil. Phosphori c. Aloes et Nuce Vom. .	= gr. $\frac{1}{20}$	,,
15	Pil. Phosphori et Zinci Sulphatis . .	= gr. $\frac{1}{40}$	,,
16	Pil. Phosphori c. Ferro et Aloes . .	= gr. $\frac{1}{60}$	,,
17	Pil. Phosphori Comp. *Fort.* . . .	= gr. $\frac{1}{25}$	,,
18	Pil. Phosphori c. Quinâ et Aloes . .	= gr. $\frac{1}{33}$	,,
19	Pil. Phosphori et Digitalis . . .	= gr. $\frac{1}{33}$	,,
20	Pil. Phosphori et Cantharides . . .	= gr. $\frac{1}{33}$	,,
21	Pil. Phosphori c. Ferro et Digitalis . .	= gr. $\frac{1}{33}$	,,
22	Pil. Phosphori c. Quinâ et Digitalis . .	= gr. $\frac{1}{60}$	,,
23	Pil. Phosphori c. Opio et Digitalis . .	= gr. $\frac{1}{33}$	,,
24	Pil. Phosphori et Strychniæ . . .	= gr. $\frac{1}{25}$	,,
25	Pil. Phosphori et Belladonnæ . . .	= gr. $\frac{1}{33}$	,,
26	Pil. Phosphori c. Cinchonidiâ . . .	= gr. $\frac{1}{66}$	,,
27	Pil. Phosphori Comp. c. Nuce Vomice .	= gr. $\frac{1}{33}$	,,
28	Pil. Phosphori et Nucis Vomicæ, Mitius .	= gr. $\frac{1}{60}$	,,
29	Pil. Phosphori, Ferri, et Strychniæ . .	= gr. $\frac{1}{60}$	,,
30	Pil. Phosphori c. Ferro et Cantharides .	= gr. $\frac{1}{25}$	,,

FORMULÆ

FOR THE ADMINISTRATION OF FREE PHOSPHORUS IN COMBINATION WITH

Aloes, Iron, Quinine, Zinc, Nux Vomica, Strychnia, Morphia, Indian Hemp, Cantharides, Digitalis, etc.

THE PRESCRIPTIONS Nos. 3 and 7 might now be omitted from these formulæ, as they are superseded by *Pil. Ferri Phosphorati* and *Pil. Quinæ Phosphorati* (see pp. 44 and 46). As the pills, however, are well known and constantly prescribed by *their numbers*, I have thought it well not to disturb the numerical arrangement of the Formulæ, and have consequently retained them. But the reader is reminded that these combinations may be prescribed in many other doses besides those indicated by the formulæ given here (see p. 42). Nos. 1 and 5 are not properly *combinations*, but these also are retained for the reason given above.

(1.)

Pil. Phosphori Pur. (Simple Phosphorus Pill).

℞ Pil. Phosphori Mollis 1½ gr.; Pulv. Gent. q.s.* M. ft. pil. = $\frac{1}{33}$ gr.) of Free Phosphorus).

Dose—One pilule, twice or three times a day, always with food.

Two pills, being equal to the $\frac{1}{16}$ gr. of Phosphorus, is a full *stimulant* dose; one that it is rarely necessary to exceed.

The REMEDIAL USES OF PHOSPHORUS have already been fully discussed. When the indications can be filled by Phosphorus alone, this pill, which contains the usual dose of free Phosphorus, will be found not only a highly convenient but a thoroughly reliable and safe mode of

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* The gentian is only used as an excipient, and has no medicinal value.

administering it. It will be seen by reference to page 42 that Free Phosphorus in this form may now be prescribed in any dose that may be required, from the sixteenth to the hundredth of a grain. Phosphorus has lately been employed with success as a substitute for arsenic in *lupus*, *psoriasis*, *chronic exzema*, and *acne indurata*, and this is the best form in which to administer it.

(2.)

Pil. Phosphori et Nucis Vomicæ.

℞ Pil. Phosphori Mollis, ½ gr.; Ext. Nucis Vomicæ, ¼ gr. M. ft. pil. (= $\frac{1}{100}$).

Dose—One or two pilules three times a day, after meals.

THERAPEUTICS.—PHOSPHORUS and NUX VOMICA, in these proportions, is a very mild but valuable remedy. It is prescribed as a nutritive tonic and stimulant to the nervous system generally, but especially to the spinal cord. This pill is serviceable in the treatment of nervous disorders dependent on defective nutrition and debility of the spinal column. It increases appetite, promotes digestion, and stimulates the peristaltic action of the bowels: it is therefore very useful in habitual constipation and dyspepsia. This may be safely given even to children in those nervous diseases in which the hypophosphites are employed with advantage. See Formulæ 7 and 28.

(3.)

Pil. Phosphori c. Quinâ. (Phosphorus and Quinine Pill.)

℞ Pil. Phosphori Mollis, 1 gr.; Quinæ Sulph., 1 gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{60}$ gr.).

Dose for Adults—Two pilules twice or three times a day, at meals. *For Children from 7 to 10 years*—One three times a day.

THERAPEUTICS.—PHOSPHORISED QUININE is a valuable combination of two powerful *restoratives*. Acting as a nutrient tonic to the entire nervous system, it gives power to the brain and spinal cord, and particularly to the functions presided over by the *organic* nervous centre. Imparting tone to the digestive organs, it gives strength to, and improves the condition of, the whole system. As a nutritive tonic, this combination is one of the best, and in most cases where Quininè is indicated, it may be prescribed with great advantage, Quinine given in this form acting more powerfully than when administered alone.

This pill has been largely employed in India during convalescence

from intermittent and remittent fevers and sun-stroke. An excellent remedy for *malaise* induced by the climate, and a prophylactic against malarious fevers.

(4.)

Pil. Phosphori c. Quinâ et Nuce Vomicâ.

℞ Pil. Phosphori Mollis, 1 gr.; Quinæ Sulph., 1 gr.; Ext. Nucis Vom., ¼ gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{60}$ gr.).

Dose for Adults—One or two twice or three times a day, with food. *For Children*—One pilule twice or three times a day.

The use of this valuable combination may be gathered from the above.

For a similar combination with Iron, see Formula 8.

(5.)

Pil. Phosphori Fort. (Strong Phosphorus Pill.)

℞ Pil. Phosphori Mollis, 2½ gr.; Pulv. Gentianæ, q. s. Ft. pil. (= Phosphorus Pur., $\frac{1}{10}$ gr.).

Dose—One pill twice or three times a day. Two pills, being equal to the $\frac{1}{10}$ gr. of Phosphorus, are the maximum dose, and only required in very exceptional cases; in very severe attacks of *neuralgia*, and in *extreme nervous exhaustion*, experience fully warrants the administration of two pills, which may be repeated in four or six hours. If nausea and vomiting occur, with or without diarrhœa, the Phosphorus should be suspended.

(6.)

Pil. Phosphori et Nucis Vom. Fort.

℞ Pil. Phosphori Mollis, 1½ gr.; Ext. Nucis Vom., ½ gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{30}$ gr.).

Dose—One or two three times a day with food. Two pills equal about the $\frac{1}{15}$ gr. of Phosphorus.

THERAPEUTICS.—This combination is especially useful in *atonic dyspepsia, lowness of spirits*, and *habitual constipation*, a condition of general ill-health and loss of power popularly known as "*below par*," commonly arising from overwork, and frequently leading to complete *breakdown*. It is useful also in cases of *impotence occurring in old and debilitated subjects;* large doses are not necessary, nor need they be long-continued: one or two pills twice or three times a day, according to the circumstances of the case, may safely be prescribed for two or three weeks

in succession with advantage; the twentieth or twenty-fifth of a grain of Free Phosphorus, taken alone or in combination with Quinine and Iron (see Formulæ 5, 9, 13, and 24), may in like manner be administered with the best results. For *seminal weakness*, spermatorrhœa, and loss of power which follows excesses, this and the formulæ named are prescribed with excellent results. In this dose and combination Phosphorus may be taken with meals during a course of hard study. It prevents mental fatigue, and increases the capacity for intellectual work.

(7.)

Pil. Phosphori c. Ferro. (Phosphorus and Iron Pill.)

℞ Pil. Phosphori Mollis, 1 gr.; Ferri Redacti, 3 gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{60}$ gr.).

Dose for Adults—Two twice or three times a day, with food. *For Children between 7 and 12 years of age*—One twice or thrice daily, with food. See Scale of Doses, page 42.

THERAPEUTICS.—Phosphorus and Iron in combination has already been fully described. It is a powerful nervine tonic and blood restorer, especially valuable in tubercular diseases, *consumption, tabes mesenterica, scrofula, and the strumous diseases and cachectic conditions of children.* It is given with great advantage in *anæmia, chlorosis*, in *sciatica*, and other neuralgic affections; also in furuncular inflammations, carbuncles, boils, etc., etc. This Pill is an excellent *chemical food* for anæmic children, and an admirable adjuvant to a course of cod-liver oil. For other strengths, see *Pil. Ferri Phosphorati*, page 44. Excellent results follow the employment of this pill in the treatment of convalescence.

(8.)

Pil Phosphori c. Ferro et Quinâ.

℞ Pil. Phosphori Mollis, 1 gr.; Ferri Redacti, 3 gr.; Quinæ Sulph., $\frac{1}{3}$ gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{60}$ gr.).

Dose as above.

THERAPEUTICS.—The uses of Iron and Quinine in combination are too well known to need any remark. Phosphorus, by stimulating the nutrition of the nervous system, imparts additional value to the combination. This is an excellent tonic in general debility, and a valuable combination in cerebral anæmia and spinal irritation. It may be prescribed in all cases for which the following preparation is recommended, when *Strychnia* is *undesirable.*

(9.)

Pil. Phosphori Comp. (Compound Phosphorus Pill, with Strychnia.)

℞ Pil. Phosphori Mollis, 1 gr.; Ferri Redacti, 3 gr.; Quinæ Sulph., ½ gr.; Strychniæ, $\frac{1}{60}$ gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{60}$ gr.).

Dose—One or two three times a day, with food, or one twice a day, and two with the mid-day meal.

THERAPEUTICS.—This is a valuable and highly efficient combination of nerve tonics. It will be found exceedingly efficacious in that numerous class of disorders which is characterized by impoverished blood and diminished nerve power, and which is often induced by over-work, by dissipation, and by excesses of various kinds, a condition in which iron and phosphorus are always strongly indicated. It must be obvious that this preparation is well adapted to effect the purposes for which these powerful therapeutic agents are usually prescribed. Free Phosphorus will be found far more effectual than the *Hypophosphites* and other feeble preparations of the metalloid in the treatment of *phthisis*.

Without particularising every condition in which this combination is useful, it may be said generally, that it is very valuable in all anæmic conditions. There can be no doubt that these tonics, taken in combination, act in a *special* manner. They answer many indications, and their action is more powerful than when administered otherwise. In constitutional syphilis it improves the condition of the blood by stimulating its regenerative power.

The Compound Phosphorus Pill is found to be exceedingly energizing and strength-giving, as a tonic for convalescents recovering from fever and other exhausting diseases it is unequalled. For other uses, see note to Formula 6. For more powerful but similar combinations, see Formulæ 17 and 27; the former pill contains gr. $\frac{1}{25}$ of Phosphorus.

For further information as to the action and use of these combinations, the reader is also referred to the therapeutic uses of Pil. Ferri Phosphorati and Pil. Quinæ Phosphorati. Pages 44 and 46.

(10.)

Pil. Phosphori c. Morphiâ. (Phosphorus with Morphia).

℞ Pil. Phosphori Mollis, 2 gr.; Morphiæ Hydroch., $\frac{1}{15}$ gr.; Zinc. Valer., 1 gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{25}$ gr.).

Dose—One twice or thrice daily, or two at bedtime. In severe cases two pills may be given as a dose.

THERAPEUTICS.—In phthisis, when accompanied with hysterical irritability and troublesome cough, and little febrile disturbance, few remedies are more efficient: it both soothes and supports. *Nervous Cough*,—one of the innumerable manifestations of hysteria,—is quickly relieved by this combination. It may be advantageously administered with *cod-liver oil*. I have seen cases of consumption in which marked improvement has resulted from a course of this medicine. In the early stages of phthisis, Phosphorus should be taken in *small doses*. I believe it to be far more efficient than the Hypophosphites, so strongly recommended by Dr. Churchill.* In some forms of neuralgia this formula may be substituted for that containing Quinine.

See Formulæ 4, 5, 7, and 8, which are also frequently prescribed in the various stages of consumption.

(11.)

Pil. Phosphori c. Cannabis Ind.

℞ Pil. Phosphori Mollis, 2 gr.; Ext. Cannabis Ind., $\frac{1}{4}$ gr. (= Phosphorus Pur., $\frac{1}{25}$ gr.).

Dose—One or two twice or three times a day, with food.

As above, when Morphia is contra-indicated, and to produce sleep.

A good aphrodisiac in some cases, where the combination with Nux Vomica fails, or is contra-indicated.

(12.)

Pil. Phosphori et Aconiti.

℞ Pil. Phosphori Mollis, 1 gr.; Ext. Aconiti Alc., $\frac{1}{16}$ gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{30}$ gr.).

Dose—One every four hours.

This combination, suggested by Dr. Prosser James, has been found very useful in the treatment of phthisis with pyrexia.

(13.)

Pil. Phosphori c. Ferro et Nuce Vom.

℞ Pil. Phosphori Mollis, $1\frac{1}{2}$ gr.; Ferri Redacti, 3 gr.; Ext. Nucis Vom., $\frac{1}{8}$ gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{35}$ gr.).

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* See *Ranking's Abstract*, vol. xxvi., page 41.

Dose—One or two pilules three times a day, with food.

THERAPEUTICS.—See *Pil. Ferri Phosphorati* (page 44). Mr. Jabez Hogg believes this formula will be found extremely valuable in atrophy of the optic nerve. It is useful in sexual debility and in anæmic conditions generally. It is especially beneficial in neuralgia occurring in persons whose vital powers are exhausted by dissipation or by hard drinking. See F. 29.

(14.)

Pil. Phosphori c. Aloes et Nuce Vomicâ.

℞ Pil. Phosphori Mollis, 2½ gr.; Ext. Aloes Aquosæ, ½ gr.; Ext. Nucis Vomicæ, ½ gr. M. ft. pil. (Phosphorus Pur., $\frac{1}{20}$ gr.).

Dose—One every day *with* or immediately after luncheon or dinner, or both, if the bowels do not act too freely.

THERAPEUTICS.—This pill is especially useful in the *atonic form of indigestion, neuroses of the stomach, hypochondria*, and other nervous affections associated with obstinate constipation. (See page 68). It is also *advantageously* employed as an occasional substitute for combinations of Phosphorus with Iron, which sometimes induce constipation.

During a course of Phosphorus and Iron, the Compound Phosphorus, or Phosphorus and Quinine, this pill may be ordered to be taken once a day with advantage as a mid-day dose, without interfering with the course of Phosphorus.

As a dinner pill this combination fills many requirements.

(15.)

Pil. Phosphori et Zinci.

℞ Pil. Phosphori Mollis, 1¼ gr.; Zinci Sulphatis, 1 gr.; Ext. Valerianæ, 2 gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{40}$ gr.).

Dose for Adults—One or two, three times a day. *For Children*—One, two or three times a day.

THERAPEUTICS.—This combination has been found exceedingly useful in the treatment of the diseases peculiar to women, *uterine disturbances, torpidity of function*, with *leucorrhœa, dysmenorrhœa*, and *hysteria;* also in *melancholia*, and other mental derangements, which so frequently occur on the appearance and cessation of the menses (change of life). Phosphorus and Sulphate of Zinc have both been found highly useful in the treatment of chorea and epilepsy. (See page 61). In these cases it must be given boldly, two pills three times a day for six or eight weeks.

(16.)

Pil. Phosphori c. Ferro et Aloes.

℞ Pil. Aloes Phosphorati, 2 gr.; Ferri Sulph. *Exsic.*, 1½ gr.; Strychniæ, $\frac{1}{60}$ gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{60}$ gr.).

Dose—One every day with dinner or luncheon, or both.

THERAPEUTICS.—Given with advantage in *chlorosis, anæmia, amenorrhœa,* and *dysmenorrhœa,* and in *nervous atony, simulating paralysis,* and as a dinner pill for the same purposes as named above. It is to be observed that this preparation contains one grain of Aloes, and operates in some cases as an active aperient; the dose should therefore be regulated accordingly.

(17.)

Pil. Phosphori Comp. Fort. (Strong Compound Phosphorus Pill.)

℞ Pil. Phosphori Mollis, 2 gr.; Quinæ Sulph., 1 gr.; Ferri Redacti, 2 gr.; Ext. Nucis Vom., ½ gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{25}$ gr.).

Dose—One or two pills three times a day. The prescriber will observe that six of these pills contain about *a quarter of a grain of pure Phosphorus,* and is double the strength of No. 9, as regards Phosphorus and Quinine; and should therefore only be prescribed in cases where these large doses are needed.

For Therapeutics, see Formulæ 2, 9, and 27.

(18.)

Pil. Phosphori c. Quinâ et Aloes.

℞ Pil. Phosphori Mollis, 1½ gr.; Ext. Aloes Pur., ½ gr.; Quinæ Sulph., ½ gr.; Ext. Nucis Vom., ½ gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{35}$ gr.).

Dose—One or two pills twice or three times a day.

A useful tonic combined with a mild aperient.

Useful in chlorosis, anæmia, amenorrhœa, dysmenorrhœa, and in nervous atony, and simulating paralysis. As a dinner pill, in the same manner as Formula 14.

For Therapeutics, see Nos. 3, 4, 14, and 15.

(19.)

Pil. Phosphori et Digitalis.

℞ Pil. Phosphori Mollis, 1½ gr.; Pulv. Digitalis, 1 gr.; Ext. Hyoscyami, 2 gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{8\,8}$ gr.)

Dose—One pill may be taken twice or thrice in twenty-four hours. The administration of Digitalis always requires caution. It is well to allow an interval of six or *eight* hours between each dose, and when long continued it is necessary to examine the pulse (in the sitting and erect posture) every few days. This combination should not be taken when *medical supervision* is impracticable.

THERAPEUTICS.—A very useful combination in diseases of the *heart*. The action of Digitalis on the involuntary muscular fibre is analogous to that of *Strychnia* and Nux Vomica on the voluntary muscular system, viz., it increases contractile force. "We must be guided," says Dr. John Harley, "by this fundamental fact, that it directly promotes constriction of the involuntary muscular fibre." Phosphorus with Digitalis is a very happy combination, its action being to promote and increase the nervous and muscular power of the heart. As a HEART TONIC, it is an invaluable medicine. In debility of the organ (weak heart), so commonly induced by excessive mental and physical over-work, and also by *hard drinking*, of which irregular or intermittent action is often the indication. It is always given with advantage as a sedative, to control palpitation arising from general nervous irritability, *exophthalmic goitre, valvular disease*, and *aneurism*. Digitalis has been called,—owing, no doubt, to its power of *increasing* the *contractile* force of the muscle,—the "quinine of the heart." In the treatment of chronic alcoholism, this and Formulæ 21 and 23 are very useful.

This combination operates actively as in diuretic; it is indicated in cardiac and renal dropsy, and with Iron in Bright's disease. Digitalis acts directly on the kidneys as well as through its effects on the heart; and the flow of urine is often copious, and the relief afforded very striking.

(20.)

Pil. Phosphori et Cantharidis.

℞ Pil. Phosphori Mollis, 1½ gr.; Sol. Cantharidis, 1 min.;* Pulv. Nucis Vom., 1 gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{8\,8}$ gr., et *Tinctura* Cantharidis, 5 min.).

* To avoid a possible source of irritation, powdered cantharides is not used. One minim of the concentrated solution employed equals five minims of the P.B. tincture.

Dose—One or two pills twice or three times a day, with food.

THERAPEUTICS.—The value of Cantharides, *internally*, has been much overlooked, and its employment too long neglected. It has been highly spoken of by modern writers on Therapeutics. In certain cases I have found it to possess very remarkable remedial power. When administered in this form it produces no irritation of the gastro-intestinal mucous membrane, but operates as a *gentle stimulant* to the genito-urinal organs. In Bright's disease, after the acute symptoms have subsided, I have found this preparation, with the Tincture of Perchloride of Iron, operate very beneficially. See "Selected Remedies,"* *Formulæ Misturæ*. Also in *chronic* urethral discharges, obstinate gleet, etc. It is especially useful in atony or paralysis of the bladder producing incontinence or retention of urine, and in the dysuria of old men. It has been employed with much success in premature failure of sexual power resulting from excesses or self-abuse in early life, and in impotence induced by passive seminal discharges.

It is useful, also, as a stimulating emmenagogue and diuretic, in obstinate cases of amenorrhœa, leucorrhœa, and in atony of the uterus.

In some forms of *chronic* skin diseases, *eczema* and *psoriasis*, this combination promises to be very useful.

Middle-aged women frequently suffer much from weakness of the sphincter of the bladder—are unable to "hold their water," and are troubled by a constant desire to pass it. These cases are much relieved by small doses of Cantharides with Phosphorus and Iron. See F. 30.

(21.)

Pil. Phosphori c. Ferro et Digitalis.

℞ Pil. Phosphori Mollis, 1½ gr.; Pulv. Digitalis, 1 gr.; Ferri Redacti, 3 gr. M. ft. pil. (= Phosphorus Pur. $\frac{1}{35}$ gr.).

Dose—One pill three or four times a day, with or after food.

THERAPEUTICS.—Of the remedial value of Phosphorus and Iron enough has been said. In its combination with Digitalis we have an admirable tonic, which cannot fail to be useful in the treatment of many forms of heart disease. It is administered as a tonic to the heart with great advantage in all *anæmic* conditions associated with feeble and irregular action, palpitation, etc. Exceedingly useful in diseases induced by *habitual hard drinking*. (See note to Formula 19.)

* Published by H. K. Lewis, 136, Gower Street, N.W.

(22.)

Pil. Phosphori c. Quinâ et Digitalis.

℞ Pil. Phosphori Mollis, 1 gr.; Quinæ Sulph. ½ gr.; Pulv. Digitalis, ½ gr.; Pulv. Opii, ¼ gr.; Pulv. Ipecac. ¼ gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{10}$ gr.).

Dose—One or two pills every six or eight hours, with food.

THERAPEUTICS.—This and the following formula (both without Phosphorus) are known as HEIM'S PILLS.

Dr. Niemeyer, in his "Practical Medicine," highly commends these combinations in the treatment of consumption; he recommends them as antipyretics. *Digitalis and Quinine* have a well-merited reputation as a means of arresting abnormal calorification and reducing animal heat. This preparation is especially appropriate in cases of phthisis, when fever of a periodic type, marked by chills and evening exacerbations, is present.

The addition of Phosphorus in small doses, operating as a *nutritive tonic*, cannot fail to give additional value to these medicines.

(23.)

Pil. Phosphori c. Opio et Digitalis.

℞ Pil. Phosphori Mollis, 1½ gr.; Pulv. Digitalis, ½ gr.; Pulv. Ipecac. ¼ gr.; Pulv. Opii, ¼ gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{15}$ gr.).

Dose—One or two pills every six or eight hours.

THERAPEUTICS.—The same as above, in cases in which Quinine is inadmissible or undesirable. This is an admirable *tonic* in the cases referred to under Formula 21.

(24.)

Pil. Phosphori et Strychniæ.

℞ Pil. Phosphori Mollis, 2 grs.; Strychnia, $\frac{1}{30}$ gr. M. ft. pil. (= Phosphorus Pur., $\frac{1}{25}$ gr.).

Dose—One twice or thrice a day.

THERAPEUTICS.—Very similar to that of *Phosphorus and Nux Vomica*, already described, No. 6. May be usefully employed when a stronger dose of Phosphorus is needed, or when Strychnia is preferred to Nux Vomica.

(25.)

Pil. Phosphori et Belladonnæ.

℞ Pil. Phosphori Mollis, 1½ gr.; Ext. Belladonnæ, ½ gr. M. ft. pil. (= Phosphorus, $\frac{1}{33}$ gr.).

Dose—One pill twice or three times a day.

In cases of extreme nervous exhaustion, two pills may be taken for a dose, and repeated every three, four, or six hours, according to the urgency of the symptoms.

THERAPEUTICS.—The action of Belladonna is that of a direct and powerful stimulant to the *sympathetic nervous system;* under its influence the whole circulation is increased in force and rapidity. In small doses it acts on the liver and kidneys as a cholagogue and diuretic.

This combination is therefore a *nervo-cardiac stimulant*, and its employment is indicated in all cases where there is depression of the sympathetic nerve force. It also allays cough and difficulty of breathing in asthma. In the early stage of *catarrh* its effects are very remarkable, it cuts short a severe attack in a few hours; and it is usefully employed in some stages of phthisis. In typhus fever it reduces temperature and lessens the pulse. In furuncular inflammation, carbuncles, and boils, it has been found beneficial, and is indicated in the advanced stages of typhus and typhoid fevers; also in puerperal fever and other adynamic states.

(26.)

Pil. Phosphori c. Cinchonidiâ.

(*Pil. Antiperiodic.*)

℞ Pil. Phosphori Mollis, gr. ¾; Cinchonidiæ Sulph., gr. 1½; Piperine, gr. ½; Podophyllin, gr. $\frac{1}{15}$; Ext. Nuc. Vomicæ, gr. ⅛. M. ft. pil. (= Phosphori, gr. $\frac{1}{33}$).

Dose—One, two, or three pills three times a day with food.

THERAPEUTICS.—A useful tonic and antiperiodic given with great advantage in *malarious cachexia* and in *ague* and *remittent fevers.* In cases of long standing, when the system has been habituated to Arsenic or Quinine, this pill is found to be exceedingly useful, and is especially adapted for persons residing in India and in other tropical climates.

(27.)

Pil. Phosphori Comp. c. Nuce Vomice. (Compound Phosphorus Pills with Nux Vomica.)

℞ Pil. Phosphori Mollis, gr. 1½; Ferri Redacti, gr. 2; Quinæ Sulph., gr. ½; Ext. Nucis Vomic. gr. ⅓ (= Phosphori, gr. $\frac{1}{33}$).

Dose—One or two pills thrice daily with food.

THERAPEUTICS.—The action and uses of this pill are given under Formula 9. It differs from that Formula in that it is stronger in Phosphorus and weaker in Iron, whilst Extract of Nux Vomica is substituted for Strychnia. The combination of THESE TONICS forms an exceedingly valuable medicine, and three formulæ (Nos. 9, 17, and 27) for its administration in various strengths have been found necessary to meet the requirements of the various cases in which it is employed. Prescribers should therefore be particular to quote *the number* of the formula they desire when ordering the Compound Phosphorus Pill.

(28.)

Pil. Phosphori et Nucis Vomica, Mitius.

℞ Pil. Phosphori Mollis, gr. 1; Ext. Nucis Vomicæ, gr. ¼. M. ft. pil. (= Phosphori, gr. $\frac{1}{60}$).

Dose—One or two three times a day.

For Therapeutics, see Formulæ 2 and 6.

(29).

Pil. Phosphori, Ferri, et Strychniæ. (Phosphorus, Iron, and Strychnia Pills.)

℞ Pil. Phosphori Mollis, gr. 1; Ferri Redacti, gr. 3; Strychniæ, gr. $\frac{1}{32}$ (= Phosphori, gr. $\frac{1}{60}$).

Dose—One or two three times a day after food.

For Therapeutics, see Formula 13.

(30.)

Pil. Phosphori c. Ferro et Cantharides.

℞ Pil. Phosphori Mollis, gr. 2; Ferri Redacti, gr. 2; Sol. Cantharides Conc., ♏ 1; Pulv. Nucis Vomicæ, gr. ½. M. ft. pil. (= Phosphori, gr. $\frac{1}{25}$).

Dose—One pill three times a day, or two twice a day.

For Therapeutics, see Formula 20.

MISCELLANEOUS FORMULÆ,*

REFERRED TO IN THE TEXT.

The following Pills, occasionally employed in the treatment of the various disorders referred to in this work, may be prepared by any respectable Chemist, or may be had coated of Messrs. H. and T. KIRBY & Co., 14, Newman Street, London, who keep them ready prepared for Hospital and Dispensary use.

SIMPLE APERIENT.

Pil. Coloc. Co. et Rhei. (F. 65.)

℞ Pil. Coloc. Co., Pil. Rhei Co., āā 2½ gr. M. ft. pil.

When a simple aperient is required, this formula will be found to answer exceedingly well.

Dose—Two pills at bedtime.

MILD MERCURIAL APERIENT.

Pil. Hydrarg., Coloc., et Rhei. (F. 63.)

℞ Pil. Hydrarg., ½ gr.; Pil. Coloc. Co., Pil. Rhei Co., āā 1 gr. M. ft. pil.

A mild and very efficient alterative and aperient. One or two may be taken every other night with good effect. An excellent medicine for children and delicate persons who cannot bear the depression of a more active aperient.

Dose—Two pills at bedtime.

Pil. Hydrarg., Rhei, et Ipecac. (F. 28.)

℞ Pil. Hydrargyri, Ext. Rhei, āā 1 gr.; P. Ipecac., ¼ gr. M. ft. pil.

An excellent alterative medicine for children taking Phosphorus and Iron.

One or two pills may be taken for a dose occasionally.

COMPOUND PODOPHYLLIN PILLS.

Pil. Podophylli et Rhei. (F. 119.)

℞ Podophylli Resinæ, ¼ gr.; Pil. Rhei Co., 3 gr.; Ext. Hyoscyami, 1 gr. M. ft. pil.

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* The numbers in parentheses refer to my *Formulary* of Selected Remedies for the Use of Medical Practitioners, published by H. K. Lewis, 136, Gower Street, W.C.

This "*Compound Podophyllin Pill*" is given with advantage in many forms of nervous affections occurring in persons long resident in tropical climates. It is very useful in melancholia, and may be employed as an aperient in all cases of inactive liver, when mercurials are contra-indicated.

Pil. Podophylli et Ipecac. (F. 10.)

℞ Podophylli Res., ¼ gr.; Pulv. Ipecac., ½ gr.; Ext. Hyoscyami, 2 gr.; Pulv. Capsici, ½ gr. M. ft. pil.

This is a useful cholagogue and alterative. It is given with excellent effect in suppression or partial suppression of the secretion of bile; is useful in hepatic enlargements, dropsy, and other disorders of persons who have lived "high," and long resided in hot climates. One taken at bed-time will usually act mildly on the bowels the following morning. May be taken every day for a week or two.

BRISK MERCURIAL PURGE.

Pil. Coloc., Hydrarg., et Hyosc. (F. 141.)

℞ Pil. Coloc. Co., 2 gr.; Pil. Hydrargyri, Ext. Hyoscyami, āā 1½ gr. M. ft. pil.

A useful combination of Blue Pill and Colocynth, operating as a *brisk* purge, it relieves portal congestion, and unloads the large bowels.

ALTERATIVE APERIENT.

Pil. Alterativæ. (F. 163.)

℞ Pil. Coloc. et Hyoscyami, 3 gr.; Pil. Hydrargyri, 1½ gr.; Pulv. Ipecac., ½ gr.; Ext. Colchici Acet., ¼ gr. M. ft. pil.

This pill acts as a diuretic as well as a purgative. The formula is taken from the Pharmacopœia of the London Hospital, where it is very largely employed; it answers many indications. A good aperient for gouty and rheumatic patients.

TONIC APERIENT.

Pil. Aloes, Ferri, et Quinæ. (F. 257.)

℞ Ext. Aloes, B.P., ½ gr.; Ferri Sulph., Quinæ Sulph., āā 1 gr. M. ft. pil.

The late Sir R. Martin recommended this formula *as an aperient in torpor of the liver*, "when the motions were *hard* and *dry*, *pale* and

scanty,"—a form of constipation which is frequently found accompanying general nervous debility and mental depression, more especially in subjects who have long resided in India and other tropical climates. A pill may be taken once or twice daily until the bowels act regularly, without suspending the Phosphorus.

ALTERATIVE APERIENT.

Pil. Podophylli c. Fel. Bovis. (F. 251.) (Hammond.)

℞ Ext. Aloes, Fel. Bovis, āā 15 gr., Podophylli, 2 gr. M. ... pil. x.

Dose—Two every alternate day.

Dr. Hammond recommends this pill in *Chronic Alcoholism*. It is useful in nervous conditions induced by indulging in stimulants.

HYPNOTIC PILLS.

Pil. Camphor Monobrom. (F. 259.)

℞ Camphor Monobrom., 4 gr.; Ext. Taraxaci, q. s. M. ft. pil.

The Bromide of Camphor is successfully used to produce sleep, in hyperæmic conditions of the brain, *Delirium Tremens*, and *Insomnia* following nervous shocks.

Dose—One pill every two or three hours until sleep is procured.

Compound Chloral Pill. (F. 186.)

℞ Chloral Hydratis, 5 gr.; Morphiæ Hydroch., $\frac{1}{12}$ gr.; Ext. Cannabis Ind., $\frac{1}{3}$ gr. M. ft. pil.

This is a convenient substitute for Chlorodyne, and may be prescribed whenever an anodyne is required.

Dose.—One or two at bedtime, when administered to produce sleep; to alleviate neuralgic pain, one every three or four hours, until four doses have been taken.

Pil. Hyosc., Camph., et Lupuli. (F. 88.)

℞ Camphoræ, Lupulinæ, Ext. Hyoscyami, āā. gr. xx. M. ft. pil. 12.

A sedative and hypnotic, useful in cases where opium and its compounds are not desirable. Prescribed with advantage for hysterical and hypochondriacal patients suffering with sleeplessness.

Dose—Two every night at bedtime.

Pil. Camphoræ et Belladonnæ. (F. 89.)

℞ Camphoræ, gr. v.; Ext. Belladonnæ, gr. ½; Ext. Hyosc., gr. iij. M. ft. pil. ij.

A useful sedative in spermatorrhœa, and to relieve irritability of urinary organs, etc.

Dose—One or two at bedtime every night.

Pil. Zinci Valer., Camph., et Belladonnæ. (F. 185.)

℞ Zinci Valer., gr. j.; Camphoræ, gr. ij.; Ext. Belladonnæ, gr. ⅛. M. ft. pil.

A nervine tonic, and calmative in hysterical and epileptic cases where there is great irritability and sleeplessness.

Dose—One or two three times a day.

Pil. Camphoræ et Hyoscyami. (F. 177.)

℞ Camphoræ, gr. ij.; Ext. Hyoscyami, gr. iij. M. ft. pil.

To produce sleep and to allay irritation in nervous affections of the uterus, bladder, and urethra, and as above.

Dose—One or two every night at bedtime.

Pil. Zinci et Belladonnæ. (F. 31.)

℞ Zinci Sulph., gr. viii.; Ext. Belladonnæ, gr. ij. M. ft. gran. viii.

Dose—One or two at bedtime.

Useful as a night pill in incontinence of urine and for irritable bladder and seminal weakness.

Pil. Antistyptic. et Nucis Vomicæ. (F. 170.)

℞ Pure Extract of Aloes, gr. ¾; Sulphate of Iron, gr. 1½; Pulv. Nucis Vomicæ, gr. ½.

Dose—One every day with dinner.

Useful in habitual constipation.

REMARKS ON THE

DOSE AND ADMINISTRATION OF PHOSPHORUS.

THE quantity of Phosphorus which should be taken for a dose is variously stated by different writers, the fact being that very few English therapeutists have had any clinical experience in its use; but all agree that its efficacy greatly depends upon the amount given, and that it is a matter of considerable importance that the dose should be carefully apportioned to the necessity of the case. Professor Stillé gives the dose as one-twentieth to one-fourth of a grain; Dr. Garrod one-fortieth to one-tenth of a grain. The latter, I believe, is the *maximum* dose, and one that cannot be exceeded without some risk of exciting disagreeable consequences. Dr. J. C. Wood, of Philadelphia, who has had large experience in the use of Phosphorus, thinks that in proper *therapeutic doses* its physiological action is *entirely different* from that which it exerts when given in *larger quantities*. He says: "Like Iron, Cod-liver Oil, etc., it appears to act, when given in minute doses, as a stimulant to the nutrition of the tissues into whose composition it enters." This is precisely the manner in which we desire it to act, *as a restorative;* and large doses should never be given, nor should attempts be made to impress the system *suddenly*. I am inclined to believe that the ill repute which for so long deterred physicians from prescribing Phosphorus, was due in some measure as much to the ignorance which prevailed as to the proper dose as to its imperfect preparation. The crude drug, in any dose, is a dangerous medicine, always producing alarming symptoms of poisoning. In exceptional cases, when it is desirable to administer Phosphorus as a *stimulant*, to rouse the nervous system into activity, as in cases

of great nervous prostration occurring in puerperal fever and other adynamic conditions, the larger doses are necessary; it may then be given in the manner described on page 30, but always with caution.

Experience enables me to say confidently, that for all general purposes it will be found not only sufficient, but safer and more efficacious, to repeat small doses frequently (say every four or five hours, and in exceptional cases every two) than to *surprise*, as it were, the system by large doses. The *thirty-third* of a grain is a medium and perfectly safe dose, and one that is most generally prescribed; but a *twenty-fifth*, a *twentieth*, or as much as a *fifteenth* of a grain may be given. The latter is seldom needed, but being proportionately more active, it may be employed when the indications for Phosphorus are very pronounced; if often repeated the effect of such doses requires watching. Persons who cannot take a $\frac{1}{50}$ of a grain, can take the $\frac{1}{50}$ or $\frac{1}{100}$ with advantage, some persons being more susceptible to the effects of Phosphorus than others. In NEURALGIA, Phosphorus is almost a specific; full doses are necessary and generally well borne: the twentieth of a grain (Pil. Phosphori gr. $2\frac{1}{2}$), or the sixteenth of a grain (Pil. Phosphori, gr. 3), may be taken. It is a good plan to give the latter dose an hour before an expected paroxysm, and to repeat it three or four times a day between the attacks. It is a wise rule, however, not to exceed a quarter, or at most a third, of a grain of Phosphorus *in the twenty-four hours.*

Whatever dose be ordered, it should not be increased without the consent of the prescriber. It has already been noticed that Phosphorus, in common with many active agents, produces totally different effects in diverse doses; and when a case is progressing favourably, or indeed if it be not progressing, it is a most unwise, not to say a *perilous* experiment, to increase the quantity ordered, or depart from the precise directions given by the physician.

Phosphorus cannot be administered with advantage, nor indeed can it be safely prescribed, unless it previously

undergo the special treatment and be administered in the manner that has already been described. This alone secures the complete *absorption* of the whole of each dose shortly after it has been taken, and prevents its premature escape in the stomach. Whether given alone or in combination with other medicines, Phosphorus should always be given directly after or during a meal; *but particularly if combined with Iron*, when it is easily digested with the food, the absorption not giving rise to any excitement, pain, or inconvenience.

ourse of sphorus, long tinued.

A Course of Phosphorus extending over many months may, it is now well known, be safely prescribed. In chronic cases it is often necessary to continue it for some time to obtain its full remedial effect; when prescribed in suitable cases improvement is generally soon observed; but in cases of long-standing disease, exhibiting great functional disturbance of the nervous system, and perhaps involving structural change, permanent benefit cannot be obtained from a few doses. In most cases Phosphorus may be taken, not less than three times a day, continuously for a period of six or eight weeks; then suspended for a few days, and again resumed for another six weeks, and with a like intermission. In this manner it may be continued for six or eight months, the patient of course being under professional observation. In *locomotor ataxy*, *paralysis*, *softening*, and *epilepsy*, it has been administered continuously for twelve months with excellent results, and without giving rise to a single unpleasant symptom. If taken with Strychnia or Nux, it is desirable to omit these for a few weeks, from time to time, and to continue the simple Phosphorus alone.

CONTRA-INDICATIONS.—Phosphorus is contra-indicated in active *congestion of the brain*, and generally in *plethoric states of the system*, and it should not be given to persons inclined to hæmorrhage. The fact cannot be too often repeated, that the drug in moderate doses acts as a *nutrient*, and may be so taken when it cannot be borne in *stimulating* doses. In doubtful cases small doses only should be given; in *anæmia* always with iron.

In a case of accidental poisoning, related by Mr. Ashburton Thompson, *half a grain of powdered* Phosphorus was taken in a pill every twenty-four hours, until nearly two and three-quarter grains of solid Phosphorus had been taken in six days. Mr. Thompson thinks *the dose* was not *excessive.* I do. The unfortunate patient was seized with severe symptoms on the night of the sixth day, after having eaten a large supper of sprats. But exception may justly be taken also to the form in which the Phosphorus was exhibited. It is well ascertained that oil favours the absorption of Phosphorus. The sudden absorption of so large a quantity of solid Phosphorus, which found a ready solvent in the oily sprats, fully explained the cause of the disaster and the cumulative action of solid Phosphorus. The lesson which this case teaches us is *never* to prescribe *solid* Phosphorus in any form.

PHOSPHORUS FOR CHILDREN'S DISEASES.

The preparations of Phosphorus most suitable for children are:—

Pil. Phosphori Mollis in ½ gr. to 1 grain doses.

Pil. Ferri Phosphorati in 2 to 4 grain doses.

Pil. Quiniæ Phosphorati in 1 to 2 grain doses.

(The above doses would contain from $\frac{1}{100}$th to $\frac{1}{50}$th gr. Pure Phosphorus.)

Formula No. 8, Pil. Phosphori c. Ferro et Quinâ, is als a very suitable medicine for anæmic children and chloroti girls.

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